THE
LARYNGOSCOPE.

VOL. XVII. ST. LOUIS, MO., JULY, 1907. No. 7.

ORIGINAL COMMUNICATIONS.

(Original Communications are received with the understanding that they are contributed exclusively to THE LARYNGOSCOPE.)

MODERN METHODS IN THE REPAIR OF CLEFT PALATE.*

BY JOHN B. ROBERTS, A. M., M. D., PHILADELPHIA.

Much improvement has been made in recent years in the management of congenital clefts of the palate. Fissure of the soft palate is not a very serious deformity, and may usually be repaired by a plastic operation without special difficulty. Freshening the edges of the cleft by paring or by splitting the tissues and applying sutures tied not too tightly may be sufficient. If such operative measures are unlikely to be followed by union, because of tension of the stitches, the surgeon may make flaps of half the thickness of the soft palate and thus bridge the gap.

On this occasion, I am considering especially the treatment of clefts of the hard palate. This condition is usually accompanied by cleft of the soft palate and often by cleft of the alveolar process of the jaw as well. Single or double fissure of the upper lip, the so-called harelip, is very frequently associated with the imperfect palate.

These congenital anomalies of development have been the subject of most surgical discussion, and to a certain extent have heretofore been the despair of operators. Operative treatment has often been unsatisfactory, because of the impossibility of obtaining and maintaining an aseptic wound in the mouth and nose, and because the tissues at hand for closing the gap have been insufficient to permit osteoplastic reconstruction without tension on the sutures. Efforts to complete the partition between mouth and nose by means of obturators with an attached movable velum have not been altogether successful. Such applicances cannot be adjusted in infancy,

* Read before the Thirteenth Annual Meeting of the American Laryngological, Rhinological and Otological Society, New York City, May 30, 31, and June 1, 1907.

must be increased in size as the child grows in stature, and would probably be difficult of adjustment in the adentulous mouth of the aged.

The problem before the surgeon is to close the abnormal communication between mouth and nose so effectually as to obviate the passage of food and air through it. Unless this is done, the infant is nourished with difficulty, and its upper respiratory tract becomes affected with chronic cartarrhal inflammation. Later its nasal chambers and its naso-pharynx fail to obtain normal development, its speech is exceedingly defective, and its facial outlines lack normal contour. As a secondary result of the palatal deformity, the cleft upper lip, when closed by operation, becomes an expressionless band stretched across the teeth. The lower lip is so prominent in contrast to this reconstructed upper lip that the mouth is ludicrously deformed, unless a large V-shaped section is removed from the bulky lower lip. In some cases it may be wise to increase the size and projection of the upper lip by inserting into it a portion or portions of the lower lip or cheek.

I shall now state my views as to the most satisfactory way of solving the operative problem presented by clefts of the bony palate. I use the term operative problem, because I believe that obturators and artificial substitutes for the hard and soft palate should be rejected as inferior to plastic reconstruction.

A. Brophy is correct in his assertion that in most, if not all, cases the cleft is due to a separation of the two halves of the roof of the mouth and not to an actual absence of the bony tissue. The congenital fissure is a want of union of the palate processes of the two upper maxillary and the two palate bones and the inter-maxillary bones. The partition wall between nose and mouth will usually be re-established, if the separated halves are forced into apposition. If the infant's mouth is closed so that the relation of the alveolar arch of the mandible to that of the upper jaw may be seen, the abnormal spreading of the upper alveolar halves will be quickly appreciated. It is not improbable that the "bite" of the mandibular alveolus inside of the upper alveolar arch may tend in the earliest months of infancy to force the lateral halves of the upper jaw still further apart and thus increase the cleft in the palate.

B. Acceptance of the propositions just stated compels the operator to grant that the bony roof of the mouth should be re-created as soon as possible after birth, provided this is possible without

grave risk to life. A simple and most efficient method of doing this is to carry wires through the two segments of the upper jaw, force them together while they are semi-cartilaginous in structure and hold them in contact by twisting the ends of the wires over lead palates.

This operation devised by Brophy is philosophically and mechanically correct. It is surgically wise, because it is quickly performed, causes little hemorrhage, and gives rise to no shock of importance. It should be performed within a few days or weeks after birth, although in neglected cases its performance is possible, perhaps, up to six months. At that time the cartilaginous jaw usually becomes too rigid from ossific deposits to be thus drawn into proper shape. Sometimes the coaptation in these late cases may be obtained, but only after dividing the jaw above the alveolus with a chisel or saw. This increases the gravity of an otherwise safe operation, because bleeding and shock are augmented. It is not improbable that children of six or more months are more shocked by simple operative procedures than newly-born infants.

After the wire "tie-beams," as they may be called, have been left in position for a couple of months, the bony roof of the mouth will be firmly reconstructed. The wires may then be removed, and the fissure in the soft palate closed with sutures. The edges of the bony cleft may be freshened when the wires are inserted; but this step is not essential. If the margins touch, the pressure will soon cause erosion and adhesion. The soft palate may be repaired at the time the hard palate is operated upon, if the operator thinks it judicious to prolong the operation at that time. It will readily be understood that the probability of success after suturing the soft curtain of the palate will be greatly increased by reason of the previous approximation and closure of the cleft in the bony palate. The upper jaw has been made much narrower and the soft parts have been carried towards the middle line at the same time. Therefore there will be comparatively little strain on the sutures which draw the soft tissues together. The margins of the cleft may even be in contact before the edges are freshened and the stitches inserted.

C. The error of leaving cleft plates untreated by operation until the patient is two, three, or more years old should not be committed. It is important to remedy the abnormal width of the roof of the mouth while the bones are sufficiently soft and pliable to be bent into place by the surgeon. This abnormality in the relative

width of the upper and lower jaws should be corrected therefore in earliest infancy. The partition between nose and mouth must be complete in early life, so that the nasal chambers, their accessory sinuses, and the naso-pharynx may be developed—that is expanded—by giving to respired air the normal, or physiological, direction of its current. The cavities of the face connected with the function of respiration cannot be properly enlarged during the growth of the infant so long as mouth and nose admit air in breathing as one merged opening.

The existence of cleft of the hard and soft palate, not only contributes to nasal, aural and pharyngeal catarrh, but may, perhaps, increase the liability to pulmonary infections. Its grave, and almost insurmountable, danger to proper speech has always been recognized; but the interference with the facial contour and the physiological needs of the voice, respiration, and dental occlusion have been appreciated only recently.

D. When early operation has been admitted and the delay has therefore allowed the displaced upper jaw bones to become ossified in their unnatural position, the wire-tie-beam method cannot be used. It then becomes necessary to cover the gap between the bones by muco-periosteal flaps obtained from the oral or inferior surface of the palate processes of the upper maxillary and palate bones.

This operative step should be done in early infantile life. It is desirable to undertake it before the molar teeth are erupted. It should be done early because the opening between mouth and nose should be closed as soon as possible in the child's life for the physiological reasons already mentioned. It is often best accomplished before the molar teeth have appeared, because one of the flaps may then be cut so large as to include the mucous membrane overlying the adentulous alveolus.

E. In this stage of the treatment I prefer to use the form of flaps suggested by Lane. He makes a crescentic antero-posterior incision on the roof of the mouth close to the alveolus. This is carried through the mucous membrane and periosteum. A muco-periosteal flap is then raised by blunt dissection from the bone, to be subsequently laid over the cleft in the palate with its raw surface towards the mouth. No incision is made along the margin of the cleft, because the flap obtains its blood supply from this region. On the other side of the cleft a linear antero-posterior cut is made, through the mucous membrane and periosteum, along the *edge* of the

fissure, and a flap is raised from the bone by undermining. The edge of the everted flap from the opposite half of the palate is tucked under this undermined flap and secured by two rows of fine sutures introduced by means of very small sickle-shaped needles.

The flap, which is to cover the fissure of the palate, and which is everted, is cut from the wider portion of the bony palate. If there be no molar teeth present, it may be made very large, when necessary, by including in its area the fibro-mucous membrane covering the alveolus and even some of the mucous membrane lining the cheek beyond the alveolus. The soft palate tissues are treated in a similar though not identical manner.

It is possible that Brophy's method of performing this stage of the treatment is as satisfactory as Lane's. I have had no experience with it. He raises two muco-periosteal flaps by undermining the tissues on the inferior surface of the fissured bony palate. Each flap is raised by an incision made at the side of the cleft. There is no cut made near the alveolus as in the Langenbeck and the Fergusson operations. The undermined flaps are brought together edge to edge in the middle line. Wire sutures carried through the flaps near their attachment to the bone are passed through leaden plates, or splints, and twisted. These tension sutures and splints steady the soft flaps and lessen the tendency of the sutures, which oppose the raw edges of the flaps, to cut out.

In both of these methods the soft palate should be freely detached from the posterior edge of the hard palate before the sutures are inserted. This step is of the utmost importance. It permits the velum and uvula to drop towards the mouth and greatly facilitates the repair of the cleft without tension on the stitches.

The palatial muscles at the hamular process should not be divided by a tenotome as suggested by Ferguson. This procedure, formerly a good deal used, it not necessary in these modern methods, and may be disadvantageous to the patient.

The harelip should, as a rule, not be repaired until the palate has been reconstructed. If the palate operation is done in the early weeks of infancy, the parents will not be averse to postponing the operation on the disfiguring harelip until the condition within the mouth has been remedied.

313 S. 17th St.

CLEFT PALATE AND HARE-LIP.*

BY KATE WYLIE BALDWIN, M. D., PHILADELPHIA, PA.

Cleft palate fortunately is not a very frequent deformity; still, according to the most reliable statistics, one child in every eighteen hundred has some deformity of lip or palate.

Cleft palate is usually, but not universally, complicated by a fissure of the lip, which may be simple or double, complete or incomplete. Such deformity may be a slight central defect in the intermaxillary bone, with a small notch in the lip. A bifurcated uvula, or any degree between these slight defects, to one including all of the soft and hard palate and dentatl arch; with a projecting or in rare cases the complete absence of the intermaxillary bone. The skin of the lip may be united when the muscles are not. The cleft of the hard palate may be simple or double; if double the space is divided by the Vomer. A double cleft is not, of necessity, more difficult to close than a wide unilateral one.

I believe that Broca, Albrect and Czerny are justified in holding that the hare-lip fissure does not usually, as is generally held, pass outside of the incisor teeth, but between the central and the lateral incisors. An incisor may be wanting and the cleft appear to be next the cuspid. Occasionally, there may be supernumary incisors. Normally, the intermaxillary bone carries only the central incisors. When the fissure does pass between the lateral incisor and the cuspid it will be found that the nasal cavity is not opened. We may have a cleft of either the soft or the hard palate alone; either one with or without the hare-lip. A cleft due to disease may be of almost any extent. At this point consider the facial clefts for a minute. I shall deal only with the congenital clefts.

Although not frequent, cleft palate is probably quite as often met with as is any congenital deformity of equal importance to the individual. If not operated on, it is a constant reminder of defect, which must to a great extent change the disposition and general mntal development of the child. An obturator, no matter how perfect it may be, does not obliterate the deformity; simply substitutes a mechanical for a natural part. Surgical measures may almost if not entirely obliterate the defect and the child forget it. It

* Read before the Eleventh Annual Meeting of the American Academy of Ophthalmology and Oto-Laryngology, St. Clair, Mich., August 30, 31 and September 1, 1906.

is for this reason that I urge that we resort to prothesis only after it is proven that surgery is of no avail. This will leave but few cases for an obturator, but in these few it is of inestimable value, and it is well that such useful ones were made before the surgical treatment advanced to its present even though imperfect stage.

Each individual experience has more or less determined the time and methods suited to secure the desired results with the least mortality. Different times and methods result differently in the hands of different operators. To a certain extent, each individual case is a law unto itself. Much depends on the general health of the patient and the extent of the deformity. If it prevents the proper nourishment of the child the deformity should be completely or partially corrected at the very earliest possible age; while delay even to adult life in some cases may be desirable. One surgeon claims success only if the operation be performed before the child learns to speak; another selects five to seven years as the most appropriate time; another after second dentition, after puberty. Still others say have the full co-operation of the patient—no matter at what age that may be. Some operate the day of birth on the lip, if not on lip and palate both. I find reported a successful operation for hare-lip and cleft palate on a child seven days old and one by Wolff on a man of fifty-two. Doubtless successful cases could be found at almost any age between these extremes. The earlier surgeons seldom attempted the operation in infancy. Many who formerly operated late now select the earliest time consistent with the general condition of the child. Others always advise mechanical appliances for all except the very slight deformities. Formerly Fillebrown of Boston, and others, gave preference to the oblurator; while at present they decide for operation.

Success must include at least two things. Success surgically is of great importance, for without this we can not hope for perfect speech, which is of great importance, as it is speech like his fellowmen that makes much for the development of the individual. This, you say, may be accomplished by prosthesis. True it may be, but it does not remove the deformity, which is an ever present annoyance. Many a child does not speak distinctly even with a perfect palate. Defective speech is incident to many conditions other than cleft palate and hare-lip, so we must not be disappointed if perfect speech does not result after correction in this cause. Eliminate all causes as far as possible, and do not neglect the training, both before and after the operation.

In favor of early operation is given: Child more easily nourished; perfect speech more likely to result; palative arch not so high and more accessible; little or no anesthetic required; hemorrhage in young children always silght; elevation of mucous membrane and perichondrium easy; vitality of flaps distinctly greater; and union between surfaces much more apt to take place. Osteoclasis must be done under four years of age. Later the bones can not safely be forced together. A partial closure tends to narrow the remaining cleft.

In favor of late operation, the argument is that one has full cooperation of the patient; the tissues are stronger and better nourished; nutrition of the teeth not so likely to be interfered with. If the hare-lip has been closed early the cleft in the palate will be much

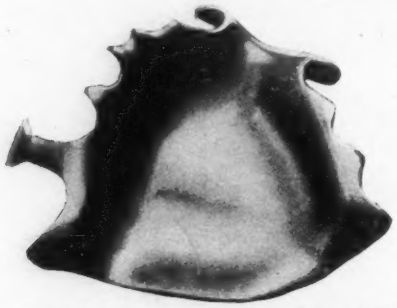

Fig. 1. Gutta Percha Plate worn before Operation and during Healing.

diminished. Early uranoplasty interferes with the complete development of the skeleton of the arch. There is much greater mortality under eighteen months. A. Jacobi is quoted as saying that tissues of the palate can not be operated on until the child is four or five years old, but that unless there be strong contraindications, the hare-lip should be operated on the first day of life when the immediate necessity of feeding is not urgent. If the cleft in the lip and palate is not to be closed at one sitting, but within a few weeks or months of each other, it is well to take the palate first on account of the added room and better view. If one must be left for years, operate on the lip first. At the present time the general opinion seems to be in favor of at least moderately early surgical treatment. Neglected cases will occasionally present themselves and advanced years alone will seldom bar surgical treatment.

In 1879 W. Fairlie Clarke writes: "If there is a large gap, the patient must be content to wear an artificial palate. The soft palate may in some cases be united and a plate used to fill in the hard palate." Another author says "that if mechanical closure is decided upon it is no good to unite the velum as it will of necessity have to be split open to make an obturator do its best work."

An obturator is not practical until after second dentition on account of imperfect anchorage and the necessity for frequent changes. The average time during which a Tubbs velum retains its usefulness is sixteen months. The worst record is four vela in two years; while the best is three in five years. The majority use about one velum a year. In 1881 Baker made his first successful appliance. As late as 1892 very pessimistic views of the surgical treatment of cleft palate were presented by those who preferred Kingsley's obturators and by others who gave preference to Svensen's appliances. Prothesis has been very thoroughly advocated, but the writers have entirely lost sight of the achievements of modern plastic surgery in the hands of many operators who have obtained ideal results. Price of Ann Arbor describes a method of reducing the cleft by means of a plate and spring.

Operation being decided on, where and how shall we secure sufficient tissue to close the space without tension. In children under four years of age, osteoclasis of one sort or another may be selected. I have seen severe shock and almost immediate death follow oteoclasis. It does not give superior results; often several operations being necessary. This operation requires much courage in one's convictions. For any operation the patient must be in good general condition and, when practical, should have some previous training and treatment. In some cases, if the patient is standing the operation well and there is not much loss of blood, the lip, hard and soft palate may all be closed at one time. It is good judgment not to extend the operation over too long a time, no matter what the immediate condition may be, as an unusual amount of shock often results. Wolff and others often operate in two stages. First mark out and elevate the flaps and leave them four days to control hemorrhage and improve nutrition. Wolff claims that the greatest mortality under eighteen months of age would be much lessened were more care taken to avoid loss of blood. Flap tissue has been and may be obtained according to the individual demands, from the remaining portion of the palate; the septum nasi, the inferior turbinal, the posterior wall of the pharynx, the side of the tongue, the forehead, lip

or cheek. That from the palate or septum is most frequently used. The flaps may be cut and manipulated in various ways. Make an incision parallel to the cleft, near the alveolar border through mucous membrane and perichondrium and through this elevate to the edge of the cleft, and well around the edge, especially at the junction of hard and soft palate, as by remembering this myotomy to give relaxation is almost invariably avoided. Freshen the edges of the cleft, slide over the flaps and unite the freshened edges with silk,

Cast No. 1. Hard Palate showing Cleft.

silk-worm gut, horse hair or silver wire—colored sutures are a great convenience. By using a slip knot first the edges are more easily adjusted and the knot is fixed by shot or a square knot. Sutures must be very close together, especially in the soft palate and uvula. A flap consisting of mucous membrane and perichondrum may all be taken from one side. Make an incision parallel to the edge of the cleft just within the alveolar border and dissect free to and around the free border, which is used as a hinge on which the flap, after being divided at the ends, is turned directly over, bringing the per-

ic'.ondrical surface into the mouth. The free edge of this flap is then sutured between the split edge of the opposite side of the cleft. This method is much better adapted to the hard than to the soft palate. Parkhill uses a triangular flap, the apex on one side being front and on the other back. The flaps are elevated and slide over to the median line, where the freshened edges are sutured in the usual way. Another suggestion for flaps is to mark out a triangle on each side, the base being the edge of the cleft and the apex an imaginary point beyond the second molar tooth. The two sides of the triangle are connected just inside the alveolar ridge by an incision through the mucous membrane and perichondrum. Through this the tissues are elevated to and around the cleft. The ends are not divided, but the tissues slid over and in the median line united in the usual way.

Murray of Liverpool uses a button suture to bring up the flattened ala. For the same, Wyeth of New York advances the anterior portion of the upper jaw on the short side and secures it with silver wire sutures. He does this six to eight weeks before commencing work on the other parts.

M. Roux, in 1819, made the first successful operation for cleft palate. This included only the velum and uvula. J. Mason Warren of Boston was the first to devise an operation for cure of fissure of the hard palate, first published in 1843. Warren was also first to suggest dividing the muscles to relieve tension. Roux employed transverse incisions, for which Dieffenbach substituted incisions parallel to the fissure. I have gone over the literature quite thoroughly and wish to give due credit for all suggestions which have in any way contributed to the present, though perhaps still imperfect methods of treatment. After dentition the proper occlusion of the upper and lower teeth is of much importance. For feeding before or after operation a nipple with soft rubber wings, and the opening on the under side in place of the end may be used. Peck suggests a sounding board as a valuable aid in teaching a child to talk. One case of severe secondary hemorrhage is reported, caused by the child picking at the sutures. A few turns of plaster bandage will control the arms, or that which is better is a pair of small, straight sleeves, which prevent flexion at the elbow, but leaves free action of the shoulder joint.

The difficulties are many and even the slight defects require study, patience and surgical skill. Not in every case will good union along the full length of cleft be secured with the first operation. If a

stitch gives out, as soon as possible introduce another. Sutures in the lip should be removed the second or third day, and tension prevented by the use of adhesive plaster. In the hard or soft palate they may remain weeks if they are not cutting, and should be removed only one or two at a time. When necessary a relaxation suture may be introduced several days after the primary operation. Any point not inclined to close may be stimulated with nitrate of silver, compound tincture of benzoin or tincture of cantharides. Keep the parts as clean as possible by frequent douches. Prevent

Cast No. 2. Showing Results obtained after Operation.

talking. Feed with liquids or semi-liquids and in extreme cases by rectum. Keep the patient out of doors as much as possible.

The case I wish specially to report is that of Robert C., thirteen years and nine months old. A country boy somewhat under size. The cleft in the lip, which had been repaired when he was seven months old, must have been quite extensive, judging from the scar, which extended at the base of the lip nearly the full width of the nose, with a much puckered one at right angle to this, which drew

the middle of the lip under the left ala. This diminished the flexibility of the lip to such an extent that he moved it very little. Three teeth were missing and a wide triangular gap in the dental arch opened the left side of the nose, which cavity was one with the mouth, the hard and soft palate being completely divided. The septum, which was displaced to the right anteriorally, extended to and was united to the pharynx, dividing it into two distinct cavities, the left being one with the nose and mouth. An abnormally developed cartilage just inside the left vestibule enabled him to completely close that side of the nose when swallowing. The right vestibule was three-fourths closed by the deflected and thickened cartilage. The nasal and pharyngeal tissues were covered with crusts and purulent secretion. Hearing was very deficient, both ears being filled with necrosed epithelium, pus and granulation tissues. The nasal and oral secretion were very offensive. The upper jaw was broad and flat, the under jaw projecting much in front of it. He had long, bushy, red hair and wore a heavy, squeaky iron brace on the right leg and foot, they having been badly crushed by a railroad train when he was seven years old. Robert's was an exceptional case, for with all this handicap he had a sunny disposition and a mental development quite beyond the average boy of his age. Had it not been for this and the fact that he had received careful home training and was ready to assist me in every way possible, it would have been very hard to spend with him the time necessary even to hope for results.

For four months we devoted the time to all-around cleansing and disinfecting. During this time, I had this plate made so as to freely escape the roof of the mouth, as we hoped to have it after operation.

He became accustomed to it and was able to eat much better with than without it.

Cast No. 1 shows the condition of the mouth April 12, 1905, when under general anesthesia, produced by ether and continued with chloroform, with Wolff's instruments, I did a plastic operation, including the soft and all of the hard palate, except a small part anteriorally, which, if included, would have endangered the nutrition of the flaps. At the same time, I cut through the extension of the septum. The flaps were obtained from the palate and septum, the tissue being disected free from a line just inside the alveolar ridge to and around the edge of the cleft on the left side and well up on the septum on the right. By means of the previously adjust-

ed plate, I was able to hold an antiseptic dressing in contact with the wound and at the same time protect it from the tongue and food.

There was quite free bleeding at times during the operation, but the boy was put to bed in good condition. Two hours later I was told over the telephone that there was some bleeding. I gave instructions and made ready to return to the hospital, when another report made me go at once. I found the patient in a very critical condition, no radial pulse and the lips and ears absolutely blanched. I quickly drew some packing up behind the palate and met it with some through the left side of the nose. This promptly stopped the bleeding. Tincture of iron, strychnine, hypodermoclysis, and at the same time normal saline solution and bovonine by the bowel saved my boy. The resident surgeon had gone immediately to another operation, leaving the case with a nurse not alive to conditions. For several days we gave bovonine by the bowel every four to six hours in addition to all the liquid and semi-liquid nourishment we could administer by mouth. The nose and mouth were thoroughly and frequently cleansed. For two weeks he spoke but once. At the end of that time he left the hospital and came to the office for treatment. Several times I did a little patching, which with stimulation gave complete union the full extent of the operation. Never despair! If a stitch gives out put in another, and put them very close together at first, especially in the soft palate and uvula. At one time, I thought it had entirely gone to smash, and the operation would have resulted in almost complete failure had I not at once gathered courage to put in new stitches.

Robert went home the first of July and returned December 4, much improved by his country outing. I now devoted my efforts especially to the ears, giving the teeth and jaws over to Dr. Alice M. Norton, the dentist who had made the protecting plate. Dr. Norton gave much time and thought to the work and by various mechanical appliances was able to bring forward the upper and push back the lower jaw until the teeth occluded, and then put in a strong heavy bridge, carrying three teeth. The bridge and the change in the jaw closed the remaining part of the cleft and probably much better than I could have done at the time of the primary operation. My only regret is that I did not have the dental work done first. I thoroughly believe that after second dentition it would be wise first to put the patient in the hands of a good dentist accustomed to regulating and have the jaws brought into as nearly normal relation to each other as is possible, and held by some me-

chanical device until there is no danger of recurrence of the deformity. It will in many cases greatly diminish the cleft and improve the general condition of the mouth.

One stage of the dental work came near proving disastrous to the new tissue of the hard palate. Had the tension been exerted a few hours longer in one direction it would have completely opened the hard palate. I shall never again let the dental work come second, as so very much depends upon it. The discharge from the ears entirely stopped and he has about three-fourths normal hearing. The nasal discharge continued to some extent when he finally left town. The flexibility of the lip was much improved by dividing the puckered scar with the knife and the transverse one with the electric needle. The right vestibule was well opened by dissecting out the cartilage. Unfortunately, the suture holding the left ala in place gave out prematurely, and I did not consider it wise to operate again at that time. He bore perfectly well all the work on the palate and the regulating, but the instant I commenced work at the naso labial junctivi he became very faint, with irregular heart action and the radial pulse very weak or entirely absent. The heart gradually recovered itself, but he felt badly for several hours. The needeling of the scar at the base of the lip had the same effect, so that I was able to do but very little at one sitting. I find one similar case reported where work at this point caused irregular heart action. Had we been working under a general anesthetic, what would have been the result? Robert developed very rapidly the last six months he was under treatment and the nervous strain from the regulating was considerable. In a few years he may be able to stand having the nose brought up into better shape. He went home June 14 with the mouth in the condition shown by the last cast.

He was able to speak so that any one was able to understand him. He was readily understood over the telephone.

320 South Eleventh Street.

SUBMUCOUS PERINEURAL INJECTIONS OF ANESTHETIC SOLUTIONS IN THE NOSE.

BY PROF. GUSTAV KILLIAN, FREIBURG, i. BR.

Heretofore I have anesthetized the mucosa of the nose by simply swabbing the surface with the anesthetizing solution, except in cases of submucous resection of the nasal septum, when cocaine and adrenalin solutions were injected. These injections were made about the anterior edge of the vomer, and were intended to produce a bloodless field for operation rather than for anesthesia. As a matter of fact, the mucosa was anesthetized only as far as the submucous spread of the solution. The increasing frequency of producing anesthesia by injections in general surgery gave me the idea of using it in nasal surgery as well. The perineural injection appealed to me as an especially available technique because of the simplicity of the nerve distribution of the nasal fossae.

The septum operation offered numerous opportunities for experiment. A careful study of anatomical preparations showing the nerve distribution of the septum was necessary. The mucous membrane of the septum is supplied by two nerves, an anterior and a posterior. The anterior is the septum branch of the ramus ethmoidalis of the first part of the fifth nerve. It courses just below the bridge of the nose in a downward arch to the floor, and supplies the mucous membrane of the anterior half of the cartilago quadrangularis. The posterior branch comes from the ganglion sphenopalatinum of the second part of the fifth nerve. It traverses the upper margin of the choana to the nasal septum, and is here termed the nervous naso-palatinus Scarpae. It descends along the upper margin of the vomer from above downward and forward, passing through the canalis naso-palatinus. This nerve supplies the rest of the septal mucosa.

To anesthetize these areas, then, only two injections are necessary, the one antero-superiorly in the region of the nervus ethmoidalis, the other postero-superiorly in the area of the nervus naso-palatinus. The higher we apply the first injection, the larger the field of anesthesia obtained. The needle should be introduced just anterior to the tuberculum septi in an upward direction below the mucous membrane. Even a few drops of the injecting fluid are so widely disseminated that there need be no fear of missing the

nerve in this anesthesia. At no time are more than a few drops necessary for this injection.

The second injection is conducted in a similar manner. The course of the nervus naso-palatinus can be readily traced by locating the upper margin of the vomer. Locate an imaginery arch from the floor of the nose to the level of the upper border of the choana. This arch should rise posteriorly to the fissura olfactoria. If this point cannot be reached, the injection may be made more anterioriy, and at a point just below the middle of the lower border of the middle turbinate. The needle may penetrate somewhat farther backward and upward under the mucosa. Here, too, a few drops, suffice to anesthetize the nerve. To facilitate the injection in the deeper area, I use an especially long hypodermic needle which has been made for me by Fischer of Freiburg. This needle is arranged at an agle to the axis of the syringe. For the injection we use a solution made by dissolving two tablets of suprarenin-cocaine (Braun—form A) in 5 c.c. of sterilized physiological salt solution. These tablets may be obtained of E. Pohl, Schoenbaum, Danzig, Germany.

In five to ten minutes the entire septum area limited by the points of injection is anesthetized, as can be determined by the probe. There is seldom difficulty in applying the injection in the concave side of deviated septa, but occasionally the convex side presents some hindrance to the technique, and where unusual deflections exist it may be possible to reach the mucosa above the site of the deflection. The area that cannot be reached in this manner by injection can be anesthetized in the usual way by swabbing. The above consideration applies only to the deeper injection. In order to avoid misunderstanding, I mention that I do not omit in any case the injection anteriorly below the vomer. All together, I make three injections on each side, and produce thereby a complete anesthesia. Tests made during the last six months have proven this to be a valuable method.

In a similar way, I have endeavored to anesthetize the lower turbinal, which is very easily accomplished. Here, too, an anterior and posterior injection is necessary. The anterior injection is made about the point of the lateral branch of the nervus ethmoidalis, and the posterior over the branch of the lower turbinal, namely, the ramus nasalis posterio lateralis, being a branch from the ganglion spheno-palatinum. The point of the first injection is located somewhat anterior to and above the anterior end of the lower turbinal;

the point of the second injection is over the posterior end of the lower turbinal. The point of the first injection is easily reached; the second is somewhat difficult and occasionally impossible of access. In the case of the lower turbinal, however, anesthesia produced by swabbing the surface is a more practical measure, in the first place, because this posterior area is so difficult to reach; and secondly, because toxic symptoms are readily produced even when but a few drops are injected into the lower turbinal. An increase in pulse, blood pressure and in some cases secondary hemorrhage, very frequently result from the deep injection in the turbinal.

I have successfully anesthetized the mucous membrane of the maxillary antrum by submucous injection in the area of the middle meatus of the nose. As the development of the maxillary antrum can be traced to the area of its ostium, it is reasonable to assume that the nerve supply of the antrum also finds passage through the ostrum. Our object, then, is to produce a satisfactory injection in the area of the ostium maxillare, namely, in the area of the lower part of the infundibulum, about the processus uncinatus and behind it. I use this method in the radical operation of the maxillary antrum, together with injections made through the mouth over the anterior wall of the maxillary antrum. I also add to this an injection in the nose above the anterior end of the lower turbinal.

Formerly we proceeded similarly, but without the injection in the nose. The mucous membrane of the maxillary antrum was swabbed with cocaine from the mouth through the wound, but this did not always produce satisfactory anesthesia. Since the injections have been made in the area of the ostium maxillare, the results in a large series of cases have been very satisfactory. The mucous membrane of the antrum was but slightly, if at all, sensitive. Here and there a small area was found which was possibly supplied by some accessory nerve. In such cases, swabbing with cocaine solution through the wound must be added. The radical operation of the maxillary antrum by local anesthesia originally performed by Dr. Karl von Eicken in my clinic (see Heidelberger Laryngologen Versammlung, 1904), has been materially improved since using the intra-nasal injection to produce anesthesia of the antrum mucosa. This method is decidedly preferable to general anesthesia when dealing with reasonable patients. I would add in conclusion that we use the Luc method in operating, and make a large fenestrum in the region of the inferior nasal meatus.

39 Friedrich St.

THE PROBLEM OF ASEPSIS IN THE ROUTINE OFFICE WORK OF THE LARYNGOLOGIST.*

THOMAS HUBBARD, M. D., TOLEDO, OHIO.

It would be futile for any one to attempt to detail a perfect aseptic system adapted to all of the varied requirements and facilities of laryngologists. Our special art is developing rapidly to a place of importance and recognized scientific accuracy, but I believe we have been remiss in not applying the fundamental principles of asepsis demonstrated in the general art of surgery to be essential and practical.. But I should add as an offset to this criticism that there are undoubtedly enough of applied aseptic hobbies in the practice of a group of laryngologists to make an ideal system. Throat and more particularly nasal surgery test the merits of aseptic technique but of necessity a paper of this character must consider routine treatment, for it may be stated as a positive conclusion that where routine treatment is conducted without particular regard to cleanliness there aseptic surgery is not possible. In other words, a most important factor is to have a clean workshop. A perfect surgical equipment may become hopelessly contaminated by carelessness in routine treatment and on the other hand a very simple and homely outfit may, with care, be kept so very clean that the best of surgical requirements obtain. The laryngologist who develops a particular system of operation naturally becomes attached to the special kind of illumination, his instruments in place and handy, and all this inspires a confidence to meet emergencies. This is a factor in the persistence with which most of us cling to the practice of doing surgery in the office rather than in the hospital. But I have no doubt but that another decade of progress will find many more laryngologists doing all of this important work in specially equipped hospitals. This is ideal and will solve the problems which at present bother us not a little.

In an address recently delivered, a distinguished surgeon had occasion to lament the growing evil of what he termed "assaults on the abdomen by untrained operators," and in the course of his

* Read before the Twenty-ninth Annual Congress of the American Laryngological Association, Washington, D. C., May 9, 1907.

remarks defined *surgical training*. Two years at the elbow of an experienced operator and under the constant supervision of many critical eyes establishes a system of technique that becomes a fixed habit and leaves the mind free to grapple with the real surgical problems as they develop in the course of the operation. It is to be expected that the influence of the "trained surgeon" will be more and more an important factor in the progress of laryngology, rhinology and otology and that a higher standard of aseptic technique will obtain. But today we are doing the most of our work in office operating rooms, at best not perfect in surgical requirements, and it is well that we occasionally confer as to methods of eliminating certain faults in the routine of treatment and operating.

The office equipment of the laryngologist is peculiarly liable to become contaminated by pyogenic germs and the danger of indirect transmission of contagious diseases is apparent. The evidences of accidental infection are not of positive and clearly demonstrable character, but I think that all operators have experienced anxiety over cases having symptoms of severe local sepsis, and still more often do we see delayed healing not accounted for by defective operation. Reports of lamentable results of surgical infection are not rare. In such instances, a careful study of the details of technique is in order and this paper is in part a compilation of faults that I have observed in my work and equipment.

A *floor covering* that will stand daily scrubbing, *sanitary plumbing*, and *fountain cuspidor*, etc., are recognized essentials; and I may say in passing, that, considering the general character of our work —the predominance of cases having acute or chronic transmissible diseases—it is of importance that the operating room be of generous size and especially *well ventilated*. This we owe to ourselves as well as to our patients.

An abundant supply of *sterile water* is important. *Antiseptic solutions* as a means of sterilizing instruments should be entirely discarded for this practice cannot but be regarded as a mere pretense at cleanliness. When one considers that it takes nearly 20 minutes to sterilize a clinical thermometer in bichloride 1-500, or carbolic acid *2%*, the futility of this practice is apparent. *Instruments must be boiled* for at least 10 minutes to insure surgical sterilization, and I would emphatically include atomizer tips and the bulb tips of the Politzer inflator. For this purpose the removable tip is desirable, as made by DeVilbiss, that it may be cleaned and boiled as any other instrument.

To protect *complicated cutting instruments* from the destructive effects of unnecessary sterilization, I have adopted the method of cleaning and boiling *after* using, and then wrapping in *gauze* and *paraffin paper* (the same having been cut of proper size and sterilized in alternate sheets). This keeps instruments bright and rustless, and further, in emergency, it is very convenient to avoid the 10 minute delay necessary for sterilization.

Solutions to be used in the atomizer can be kept sterile in a closed receptacle having a four-candle power electric lamp. The one that I use maintains a temperature of about 160°.

The *cutoff* and *tubing* should be protected by a gauze covering—one made like an abbreviated umbrella cover is easily adjusted, and of course the renewal should be a part of preparation for every operation. Operator and assistant should use rubber gloves and gown if the occasion demands it.

We are now fortunate in being able to procure *syringes* for nasal, post-nasal and ear irigation that can be sterilized by boiling. The *asbestos packing*, as perfected by Ermold, N. Y., is the most satisfactory and its use eliminates one very prevalent defect in our routine treatment as well as in operations. The *laryngeal mirror* can be boiled for a short time. The *head mirrors* can be covered with one thickness of sterile gauze without reducing illumination perceptibly, or a metal clip can be used for manipulating it. I have experimented with *whalebone bougies* and find that they stand boiling for a half minute, which removes oily material, and they can then be immersed in carbolic acid 4% without impairing elasticity or smoothness, but it should, of course, be borne in mind that all instruments of this character, however cleaned, become brittle in six months (more or less) of service, and should always be tested before using. In fact there is no excuse for using any instruments that cannot be surgically sterilized, that is, cleaned and boiled.

A very satisfactory substitute for the *gauze handkerchief* (which may be more desirable in operations) is a *paper napkin*, made in this country (Dennison & Co., New York), and concerning which I have made some investigations. In the process of manufacture an absolutely sterile article is produced and the makers have assured me that in the subsequent preparation for the market, the work being done by machinery, there is little or no chance of contamination. Culture tests, maceration in bouillon and incubation for 48 hours showed that the samples taken from broken packages were practically sterile.

The steam sterilizer is an absolute necessity in every office—one that subjects contents to live steam heat and dries by superheated air. I have applied the *small test tube* method of sterilizing gauze for nasal operations and find it practical to prepare in small rolls, enough for one ordinary packing in a tube.

The operators hands will, of necessity, come into more or less frequent contact with the patient's face and as a routine procedure there should be a thorough washing of face, or as some operators prefer, a partial mask may be applied. I have found the *clip* and *elastic band* used by dentists to retain the rubber dam very satisfactory for the purpose of retaining the gauze mask.

The sterilization of the *mucous tract* to be operated upon, and of course most of these details refer to intranasal operations, should be attempted, and the most rational process is an adaption of the method used by gynaecologists in sterilization of the vagina. An irritant like boric acid in sterile water, or a dilute Dobell's solution, or glycerine tampons, excite a copious flow of sero-mucus which flushes out the glands and recesses of the mucosa effectually and then by spraying or irrigation a fairly sterile field is assured, excepting in cases having suppurative conditions or atrophic areas. The reactionary flow of sero-mucous, following operation and subsidence of local anaesthesia and ischaemia, is a most important aid in prolonging the aseptic condition, and this is one reason why a too firm packing should be guarded against—the mechanical pressure preventing the saturation of dressings with the normally aseptic secretion.

Sterilization of the *throat* should be preceeded by careful attention to the cleaning of the teeth and mouth, followed by antiseptic spray and gargle, but at best we can only try to remove superficial deposits. It is not practical to attempt a cleansing of the naso-pharynx, before or after operation, the danger of infecting the middle ear being very great, and especially in children in whom the lumen of the tube is proportionately larger than in adults.

The *quality* of *air* used under compression for atomizers and direct inflation deserves special study. The location of the intake tube should be given attention with the purpose of getting air as free as possible from dust and odor. As a rule it is best to have the intake tube near the ceiling of the operating room—supposed to be the cleanest of all—and even when so placed if the experiment will be tried of capping it with a large ball of cotton a few weeks experience will demonstrate the advisability of filtering the air.

Air tanks and *pumps* are not specially cleaned before being set up and the contents often have a disagreeable odor. To purify the tank pour in a few ounces of essential oils (cinnamon, cassia, or peppermint), which will impart to the air a pleasing, aromatic odor, and at regular intervals saturate the cotton at the intake with formaldehyde and allow the pump to run, valves all wide open, until all traces have disappeared. As to the importance of all this attention to the quality of air in the compressed air-tank there may be a wide divergence of opinion. That the tank becomes a reservoir for the accumulated dust there can be no doubt, as sedimentation must take place in the absence of disturbing air currents and with years of service there must be a considerable deposit.

I have had made culture tests, using agar Petri dishes and slants to determine whether or not the dust that accumulates in the tank is carried into the exit tube and escapes in the air current.

Exposures were made under varying conditions—the air from a tank long in service and that from one recently set up—with control tests of the air of the room, and the only conclusion that could be drawn is that the air from the tanks is in a measure freed from dust by the process of sedimentation within the tank, but there is also a difference in result depending on the kind of cut-off used. One that simply compresses the rubber tubing when wide open gives a free lumen and large volume of air and more accumulated dust escapes than obtains with the piston cut-off which allows only a small stream of air to escape, and does not agitate the main body of air in the tank or tubing.

Although experiments along this line are of little value in determining the purity of the air used in atomizers and for direct inflation, and I present them with no claim to scientific accuracy, yet I feel justified in thus calling attention to the ease with which the air drawn from almost any source can be rendered surgically clean and safe for use at any stage of an aseptic operation; and also the facility with which we can prevent the contamination of the solutions in atomizers in so far as the compressed air is concerned. *Dry cotton filtered air in a tank kept as clean as possible by occasional use of vapor antiseptics should be a feature of every well-ordered office operating equipment.*

In closing, I will say that I trust that this paper will be taken for what it pretends to be, i. e., merely a compilation of suggestions for the promotion of surgical cleanliness in routine office treatment and special operations. The surgeon, in whatever special field or

working environment, must constantly bear in mind that only by high ideals in the refinement of cleanliness, in theory and practice, can he expect to stimulate his associates and assistants to the proper discharge of their part of the work.

The fact that the individual is immune to the ordinary bacteria that inhabit his respiratory tract has cultivated in the profession a degree of carelessness bordering on indifference, but it is none the less a surgical misdemeanor to introduce foreign germs, and this can be guarded against only by the development of a thoroughly consistent and practical system of surgical cleanliness in routine treatment and office surgery.

205 Ontario St.

Local Anaesthesia in Ear Surgery. H. NEUMANN *Deutsche med. Wchnschr.*, April 12, 1906.

The author justifies the use of local anaesthesia for ear operations, as described by him, by reviewing the anatomical arrangement of the nerve supply of the external ear.

The injection for middle-ear operations is made into the upper canal wall; for mastoid operations, under the periosteum of the mastoid bone; for the radical operation both injections are combined. YANKAUER.

OCULAR DISEASES OF NASAL ORIGIN.*

BY JAMES ALLEN PATTERSON, M. D., COLORADO SPRINGS, COLORADO.

The immense strides made in Ophthalmology and Rhinology in recent years, particularly rapid in Rhinology, has kept the independent worker in these specialties so busy apparently that the interdependence of nasal and ocular maladies has been partially lost sight of. Even now, as well known as is the relationship of lachrymal diseases to nasal disorders, we find nasal treatment largely neglected.

As a student in Ophthalmology, I observed that a metal canula introduced into the sac and down the duct into the nose through which boracic solution was syringed, gave in many instances better results than simply probing the duct. It was surely a painful method of nasal irrigation.

I am not ready with sufficient data to prove an assertion that the majority of cases of lachrymal abscesses are of ethmoid origin; but the fact that in so many of these cases an attempt to probe the duct will disclose roughened bone and that unless great care and skill are exercised the probe will enter the nostrils behind the duct through the ethmoid cells rather than through the lachrymal passage makes my belief tenable. I do not assert that we do not get some catarrhal conditions carried from the eye downward, but I am strongly of the belief that conditions of this sort are in the minority.

It has been my habit where a conjunctivitis is complained of and the conjunctival congestion is largely in the lower lids rather than the upper or the bulbar conjunctivae, to suspect the lachrymal passages and still further the nose of being the focus. Only a few weeks ago I had a striking example. I was consulted by a lad of 14 years, who came for conjunctivitis of the left eye only. There was hyperæmia of the skin of both the upper and lower lids, the patient being of a florid complexion made such more noticeable. The unilateral conditions led me to suspect a foreign body, as the complaint was of only three or four days' duration. Search for such was negative. I was, however, impressed by the fact that the

* Read at the Meeting of the Western Section of the American Laryngological, Rhinological and Otological Society, Denver, February 16, 1907.

congestion of the conjunctivæ was confined almost exclusively to the lower bulbar and lower palpebral conjunctivæ. Fruther questioning elicited the fact that there was pain of this number of days standing limited to the left brow, temple and less severely the malar eminence. A further history of rhinitis of a week's duration was obtained. Examination of the nose showed bogginess of the middle turbinate, and after cocain and adrenalin dilatation, pus was seen coming from the neighborhood of the left ostium naturale of the antrum. Drainage and irrigation soon cured pain, conjunctivitis and catarrhal conditions. The patient had enlarged tonsils and adenoids which were subsequently treated surgically.

Vieusse[1] and others believe that tuberculosis of the conjunctivæ sometimes arises from extension of the unrecognized nasal tuberculosis.

I think we are only in the infancy of our knowledge of the causitive relationship of the nose to some forms of keratitis. At least, those of us who have had our hard knocks treating phlytenular keratitis in the young are impressed with the fact that we had better not neglect the nostrils unless we take the chances of having our reputations injured. I have had, as you no doubt have had, the most brilliant cures in this malady following an adenotomy with or without tonsillotomy, and I believe I cannot urge too strongly the necessity of thorough nasal exploration in all forms of recurring keratitis.

A few days ago I did an iridectomy for optical purposes on the left eye of a boy of 16 years, who had very large tonsils. It was necessary to give a general anasthetic. Permission to remove tonsils a few weeks before the operation on the eye was refused. Anaesthesia was induced only after a long preliminary struggle. Twenty-four hours after the operation five punctate superficial ulcers appeared upon the unoperated eye and subsided in twelve hours under argyrol and iodoform ointment. Forty-eight hours afterward the disease reappeared in the same eye, although the distribution of the areas was different, this subsided in twelve hours under the same treatment and did not recur when daily spraying of the nostrils with a simple saline solution was instituted. The nose had been treated daily for a week previous to the operation in order to prevent any complications.

I believe the case reported by Schneideman[2] in 1904 of Central Superficial Choroiditis of one eye only, to have been due to pent up sphenoidal secretions discovered when pus was found to be flowing

from that sinus; the choroiditis as reported rapidly improving from that time. It is a most difficult thing to exclude as a non-focal point a sphenoidal sinus which is not discharging, and in many such instances not to be reached by a probe without previous surgical removal of a middle turbinate.

Schmieglow[5] has recently reported "two cases of Retro-bulbar Optic Neuritis due to Sphenoidal and Ethmoidal Sinusitis."

The literature of asthenopic symptoms, contracted fields, affections of extra ocular muscles, pupillary changes, etc., have been gone over so well by Posey[4] that it is useless to repeat them.

The pathology I believe to be one of absorption from diseased conditions in the superior and middle meatus of the nose, the anatomical reasons for which I have previously set forth in an article "Concerning the relationship of Nasal Disorders to Vitreous Opacities." I wish I could have illustrated that article with the excellent cuts of the "Arterial connection between the nose and its accessory sinus," and the illustration from Zuckerkandl which C. R. Holmes[6] has made use of in a monograph, "Head Pains and Eye Symptoms caused by Inflammation of the Accessory Sinuses of the Nose."

Dr. Holmes has well said that "lowered blood pressure and slower circulation (during sleep) * * * cause the secretions" of the nose to flow more slowly, and favor inspissation, and that "decomposition is constantly going on." It is really wonderful how well the eye is protected from the diseases that immediately surround it. Its bony envelope, its elevation above the nasal cesspool and its arterial supply from the deep carotid rather than from superficial trunks make it a veritable Port Arthur. Yet, like the Russian stronghold, prolonged siege will make inroads. My previous observations above noted have shown that when there is good drainage from any of the accessory sinuses the deeper tissues of the eye are comparatively free from attack, but even a small focus of pent up secretions and their decomposition will make inroads upon its integrity, either by erosion of its bony envelope, extension by contiguity or absorption, as previously stated. Ziems theory of "passive orbital venous Stasis," as pointed out by Manning Fish[7] in a very large and most interesting series of cases of "Uveitis due to Accessory Sinus Diseases," is admitted, but this must account for cases showing the more acute symptoms of pain, more or less severe, of rapid rather than sluggish onset, together with the accompanying symptons, such as accommodative disturbance. Its continuance favors absorbtion of peccant material.

In all cases of unilateral ocular maladies the nose should never be forgotten as possibly being able to furnish evidences of the cause of the disease.

Strader of Cheyenne[8] has recorded a case of glaucoma markedly benefited by treatment of the nostril of the corresponding side by suction methods. I have verified his findings in relieving cases of acute sinusitis by this method. Frank E. Brawley has devised an ingenious instrument for the purpose.

I desire to report the following cases:

CASE 1. This case is briefly reported to the Colorado Ophthalmological Society.[9] J. K., age 39, a railroad section boss, was first seen in June, 1905. He had entered a general hospital some few weeks before, where he was said to have been treated for severe neuralgia of the head. The pain being most intense in the right temple and so severe as to prevent sleep. Eventually proptosis 3 mm and diplopia occurred, when Dr. E. R. Neeper saw him, who found at that time T+1. As there was a suspicion of their being a nasal complication, I looked over the case with Dr. Neeper.

At this time, June 23, O. D.v 5/10, O. S.v 5/5. Tension had fallen to normal under pilocarpine collyria prescribed by Dr. Neeper. There was a mild papillitis of the nerve of O. D. with fine flame-shaped exudiations radiating from the nerve up, in and down, the media was, possibly, slightly hazy. The eye ground of O. S. was in health. He is unable to move O. D. out beyond the middle line and the movement in was possibly slightly restricted, he had full movement downward, but the ability to turn the eye upward was materially interfered with. Proptosis from my scale, 8mm.

Under cocaine I curreted the ethmoids seemingly as far back as they extended, the tip of the curette entered 9mm from the floor of the vestibule both frontal sinuses transillumined clear. It was impossible to probe the right owing to a deflected septum.

Pain speedily lessened after this drainage and the proptosis gradually subsided. Five days afterward vision was 5/5, the papillitis was subsiding and the media much clearer; diplopia homonymous with R. H. 6°. July 15 my notes give: v=5/5, papillitis had subsided and proptosis not noticeable. Diplopia complained of only on looking to his extreme right.

Several currettement were made of the ethmoids and when last seen, on August 15, the v=5/4, eye grounds were normal, diplopia only on looking to his extreme right. The patient returned to work though there was still pus flowing from the ethmoid cells. Consent to further operative proceedure was denied.

CASE 11. J. J. C., male, age 38, was first seen on April 28, 1904, presenting oedema, and redness of the skin above the inner canthus of the right eye. The case had been treated as erysipelas for some

days. This abscess was incised and pus liberated. The case did not return until the following July 16, when there was found a sinus at the point of my incision through which a large amount of pus had discharged daily. Pus was found in the middle nasal meatus which was occluded by a polypus. Transillumination showed a faint shadow in the lower part of the right frontal sinus with light transillumination of the right maxillary antrum a trifle less than that of the left. O. D. was then in health. Operation was advised but consent to it not obtained.

This case was not seen again until December 17, 1906. The sinus previously described remains although the amount of pus coming from it was much less. A probe enters 25mm by carrying it backward and upward at an agle of 30°. Middle turbinal is enlarged and polypoid. No pus could be obtained from the frontal duct.

He gives a history of great pain in O. D. for the past year, sufficient at many times to keep him awake at night. During this time, the sight in this eye has declined to light perception only. The cornea is now uniformly opaque nothing, not even the iris, can be seen through it; there are some fine vessels upon its surface; the conjunctive is white T. N. Vision in his left eye is 5/3. A pathetic evidence of neglect.

CASE 3. A lad of 14 years consulted me a week ago for pain in the left eye, the entire frontal region and left temple. This was accompanied by intense photophobia of the left eye with some lachrymation. He was unable to attend school for the past two days owing to the discomfort and inability to use his eyes. No foreign body could be found nor any form of corneal disease, the lower conjunctival cul de sac was distinctly conjested the right to a very much less degree; there was no pus in the eye. The lids had agglutinated the night before. He has worn satisfactorily and comfortably for five months the astigmatic cofrection +0.75 cy ax 90 in each eye, which gave him normal vision, the eye grounds were in health. History of a mild rhinitis of three or four days duration was learned.

In the left nostril, after prolonged exploring, muco-pus was liberated from the anterior ethmoid cells. Pain in his eye ceased while he was in my operating chair, the headache continued and was not relieved by suction. The next day muco-pus was flowing unobstructedly in limited amount, coming down between the middle turbinate and the outer wall. All pains complained of had ceased, photophobia and lachrymation had disappeared.

CONCLUSION.

You will remember that some years ago the progress of otology was hindered by not having the nasal source of its many diseases treated as well as now. I believe that ophthalmology, while far less

dependent upon rhinology, can learn much to its advantage by the interdependence of the two special practices.

BIBLIOGRAPHY.

1. Quoted by Stevens in *Colorado Medicine*, January, 1907.
2. Transactions Amer. Academy Ophth. and Oto. Laryngology, 1904.
3. SCHMIEGELOW, E.—"Hospitalstidende." See *Journ. A. M. A.*, Vol. XLVIII, No. 2.
4. POSEY, W. C.—Trans. Ophth. Section A. M. A., 1905.
5. PATTERSON, J. A.—*Ophthal. Record*, March, 1905.
6. HOLMES, C. R.—*Ohio Med. Journ.*, February, 1906.
7. FISH, MANNING—*Amer. Journ. of Ophthal.*, December, 1904.
8. STRADER—*Oph. Record*, Trans. Colo. Oph. Society, January, 1907.
9. PATTERSON, J. A.—*Ophth. Record*, Vol. XIV., page 591.

805 N. Tejon St.

Mouth Cleanliness. M. A. SMALE (London). *St. Louis Medical Review*. Sept. 29, 1906.

Smale's paper is of main importance to dentists, but is of value to all physicians. He concludes that:

1. The mouth is the best breeding place possible for bacteria.

2. That even with all one's natural teeth, it is practically impossible to keep the teeth surgically clean.

3. That fixed bridges, no matter how beautifully they are made and fitted, can never remain aseptic in the mouth whatever antiseptic washes or tooth brushes and powders are used.

4. That removable bridges or dentures are the only justifiable methods of replacing lost teeth.

5. That, speaking generally, it is unjustifiable to cut up or destroy sound teeth for the purpose of using them as abutments for bridges.

EATON.

A CERTAIN PHASE IN THE DIFFERENTIAL DIAGNOSIS OF TUBERCULOSIS AND SYPHILIS OF THE UPPER RESPIRATORY TRACT.

BY LEE MAIDMENT HURD, M. D., NEW YORK.

It is not my purpose to differentiate in parallel columns syphilis and tuberculosis as they appear in the upper air passages, for it would take too long and be detail *ad nauseam* before such an assemblage. I only wish to call to your attention certain conditions which are confusing to both the miscroscopist and the clinician. Inflammations and ulcerations which may clinically closely resemble either syphilis or tuberculosis, or perhaps neither. The correct diagnosis in these cases is of much importance for the patient's peace of mind and future welfare. More than likely some of the reported cases of cured laryngeal tuberculosis have been syphilitic.

This short article was prompted by the following three cases:

CASE 1. Mary K., age 25; servant; native of Finland.

Noticed nasal obstruction about one year ago, which gradually grew worse. The fact was elicited that there was some pain in nasopharynx and across bridge of nose before she noticed the nasal obstruction. Other than this there were no local or general symptoms, and to all appearance she is in the best of health.

There is no family history of tuberculosis, or any tubercular people in the family in which she is employed. On examination of the nose and pharynx, a growth occupying the vault and posterior wall was found with a slightly nodular surface covered with mucous membrane of normal color and appearance. I removed the growth with forceps and submitted it to Dr. Jonathan Wright, who reported as follows:

"Microscopic examination of a piece removed by forceps shows that in mounting the hardened specimen crumbled from the hardening process. Many of the fragments show very plainly perfectly typical tubercle. Centres of tubercle granulum or necrobiosis are surrounded by a rim of new connective tissue in attempts at repair. In a few of these areas may be seen a typical Langerhans giant cell. Some of the round cell tissue apparently at a distance from the tubercles is altered somewhat by chronic inflammation and contains no lymph nodes. The tubercular tissue, or rather the tubercle granula, are not immediately under the epithelium which is fairly normal calumnar, but separated from it by a rim of lymph cells This is the second case only which I have seen in which there

were multiple tubercles in a posterior lymphoid hypertrophy, the other having been from the service of Dr. Chappell and reported by me with a color plate in the *New York Med. Jour.*, Sept. 26, 1896. Perhaps, owing to the scantiness of the lymphoid tissue, there being no modes, it is not accurate to call this tubercle of the adenoid, but of the naso-pharynx.

"A search of 10 sections failed to reveal any tubercle bacilli."

"March 15, 1906. Two guinea pigs inoculated.

"June 6th, 1906. One of the Guinea pigs inoculated two months before with pieces of the growth removed from the naso-pharynx beneath the skin of abdomen showed enlarged inguinal glands. The other Guinea pig showed beginning round celled infiltration (presumably tuberculosis) of the smaller bronchi."

J. WRIGHT.

Although latent tuberculosis of the lymphoid tissue in the vault is not an infrequent occurrence, a purely tubercular growth like this I believe to be unique. This patient made an uninterrupted recovery.

CASE 2. G. S., aged 57, U. S. brass worker; married. June, 1906. Family history is clear. Previous history, usual children's diseases. Denies both gonnorheal and syphilitic infection, although he says he has lead a wild life, and could very well have been infected. Seven months ago he gradually became hoarse without cough or other symptoms. He states he has had previous attacks of hoarseness, which have disappeared of heir own accord. The lungs are normal. Repeated examinations of sputa fail to show tubercle bacilli. On examining the larynx, we find ulcerations along the posterior two-thirds of right vocal cord and posterior one-third of left cord. The laryngeal mucous membrane is slightly congested. The ulcerated area is covered with a white exudate, and the ulcerations are not very deep; the edges do not seem undermined.

A section was removed and sent to the Pathological Laboratory, and Dr. Jonathan Wright reported as follows: "The specimens on section show areas of coagulation necrosis, and in them or near them typical Langerhan's giant cells and epithelioid cells. Subsequent sections were examined for tubercle bacilli, but none were found."

Dr. Harlow Brooks, who saw the same section, reported as follows: "The coagulation necrosis is rather less definite than is usually the case in tuberculosis. There is general hyperplasia of the connective tissue with thickened arterial walls, with periarteritis most marked. Inclines me to think it is syphilis."

This case was injected with salicylate of mercury, gr. 1, weekly, for nearly six months. Potassium iodide was prescribed, but I doubt if it was taken regularly. For the last six months the ulcerations have been entirely healed, which shows beyond doubt that it was syphilitic. He was under mixed treatment several months before the ulceration showed any tendency to heal.

CASE 3. L. W., age 45; male. Gives negative family history. Previous history of syphilis twenty years ago. Is an alcoholic. Several years ago, while drinking to excess, he had a cough with slight night sweats. He has had no cough or night sweats for three years. Four months ago he became gradually aphonic. Two months ago dyspnoea developed which has steadily increased until at present he labors considerably for air. On examination the lungs and heart were normal. No syphilitic scars in nose or throat. His larynx contains so much thickened and inflamed tissue that the merest chink remains for breathing. The false and true cords are greatly thickened, with ulcerations on the true cords; also considerable subglottic infiltration below left cord with an ulcerated surface. The ulcerations did not appear deep, or have undermined edges.

The laryngeal mucous membrane was deeply congested with some mucous secretion. I made a clinical diagnosis of syphilitic infiltration with ulceration. Dr. Wright was inclined to the same belief, but thought it might be malignant. The patient was admitted to the Manhattan Eye, Ear and Throat Hospital, and placed upon mercurial injections and potassium iodide in large doses. This was changed at the end of a week, at the suggestion of Dr. Wright, to bichloride and potassium iodide by mouth. The third day after admission a tracheotomy had to be performed. The mixed treatment was continued for five weeks without apparent effect upon the laryngeal condition, except that dyspnoea decreased somewhat. He wore the tracheotomy tube most of the time and the rest that this gave the larynx may account for the improved breathing. The secretion from the tracheotomy tube was repeatedly examined for tubercle bacilli without results, and a portion of the growth was removed from over the left arytenoid and examined by Dr. Wright, who reported as follows: "The epithelium is flat, undergoing great hyperplasia and dipping down with the stroma in all directions, there being in these sections some separate islands of it. It is sharply differentiated from the stroma and has no appearance of malignancy. In the stroma are large areas of necrosis of tissue, containing giant cells of Langerhan's. So far as these appearances go, we are compelled to assume the presence of tuberculosis, though there are some thickened nasal walls which remind one of syphilis."

Dr. Harlow Brooks, who has examined the same slides, states that microscopically it looks like tuberculosis.

After remaining five weeks with us, he was transferred to the City Hospital, with a note from Dr. Wright stating that he was inclined to believe the case tubercular. At the City Hospital his sputa was repeatedly examined without results, and he was discharged at the end of three weeks, when he again reported to the clinic. I found his laryngeal condition considerably improved; the thickened tissue had gone down about 50%. He had received no medication while in the City Hospital. He then went on a spree, and I have not seen him since. He may have developed Laryngeal Edema and died.

I attribute his improvement to the mixed treatment that he had before going to the island. His tracheotomy tube was corked all the time that he was there, so we cannot say that the improvement was due to rest of the parts. The improvement in this case was most marked, and leaves little doubt in my mind that if treatment had been continued long enough the laryngeal condition would have been completely cured.

Dr. Eugene Hodenpyl, who examined the slides from these cases, January 2, 1907, reports as follows:

"I have examined microscopic slides of your cases: To be brief, each case, I think, presents in a fairly typical fashion the morphological character of a tuberculous lesion."

Certain phases of syphilis of the mucosa are histologically identical with tuberculosis. I refer to those in which there may be easily demonstrated under the microscope a number of giant cells. These giant cells do not seem to differ in any way from the so-called Langerhan's giant cells.

Given an area of chronic inflammatory action of the mucosa, crowded more or less with round cells, whether there is any surface loss of epithelium and consequent ulceration, or not, the pathologist must be careful in making an unqualified histological diagnosis of tuberculosis, because in every field he sees one or several giant cells.

The presumptive diagnosis, whatever the clinical history, should be syphilis when the marked vascular thickening and the number of giant cells are out of all proportion to and more prominent than the coagulation necrosis, unless the tubercle bacilli can be demonstrated in the tissues.

It is true that giant cells are much more often found in tubercular than in syphilitic foci of chronic inflammation, but when they do occur in syphilis they are much more numerous than is usual in tubercular cases.

I refer especially to swellings and ulcerations of the mucosa, granulomata, not large gummata or extensive tuberculous softening like lymph nodes. Tertiary syphilitic processes of the upper air tract are usually destructive, often invading the bone; the granulomatous infiltrations of the mucosa are of less frequent occurrence.

Manasse (*Virchow's Archiv.* 147, 1897) states that the presence of giant cells or of miliary nodules containing the giant cells is not positively available in the determination of the question as to syphilis

or tuberculosis. These features being sometimes present, sometimes absent in either disease. It is hardly necessary to mention that caseation and other degenerative processes occur in syphilis as well as in tuberculosis, and that the presence or absence of these retrogressive metamorphoses does not constitute a distinctive sign between these two diseases; neither is the production of connective tissue which leaves familiar scar formation, a reliable sign, as it is also found in fibrous tubercles, etc.

Arteritis, leading to vascular obliteration, is often quoted as a characteristic feature of syphilis, and as a matter of fact, this condition is almost constantly found. However, this vascular change is not entirely conclusive, for it is met with in tubercular conditions as well.

The giant cells perfectly resemble Langerhan's giant cells met with in tuberculosis. Certain authors claim that the giant cells originate by individual growths from a single cell; others, that several cells are concerned in their growth. The general tendency seems to be to regard them as cross-sections of pre-existing channels, either vascular, lymph, or glandular, on account of their parietal nuclei. But whatever their true origin, it may be assumed as a foregone conclusion that it is the same in both tuberculosis and syphilis.

The only conclusion that can be drawn is that the microscope and the clinical picture cannot be unqualifiedly relied upon; in fact, unless the tubercle bacilli can be demonstrated in the tissues or by inoculation, we should consider the condition syphilitic; and also that the ordinary doses of mercury and potassium iodide will show small results in these connective tissue conditions. It requires mercury and potassium to the limit administered over a considerable period of time to show satisfactory results.

15 East 48th St.

ANATOMICAL AND SURGICAL CONSIDERATIONS OF THE SINUS FRONTALIS.

BY H. J. H. HOEVE, M. D., DES MOINES, IOWA.

In studying the frontal sinuses in the different textbooks of anatomy we cannot fail to get the impression that normally these intramural sinuses consist of two cavities, which are located between the two layers of the frontal bone, just above the root of the nose and the mesial third of the supraorbital ridge. This is due to the superficial treatment that a general textbook gives this subject, even though of enormous surgical importance. The development of the frontal sinuses is peculiar in more than one point. They are formed, like the sinus sphenoidalis, much later than the maxillary sinuses, and the ethmoidal cells, which are completed before birth. According to Cunningham, traces of the frontal sinuses may be found in a great many cases about the second year, although they can not be distinctly recognized before the age of seven. According to Treves, the sinuses are not marked before the age of ten, while Combe states that they do not exist before the age of twelve. So, in summing up the statements of these various authorities, we can readily see that we do not have to pay much attention to them before the twelfth year.

The first developmental difference from the other sinuses is that the frontal has to develop after birth, whereas the others, except the sphenoid, were present, although incomplete at birth. The second point is, that this sinus, like the sphenoid, is formed by an invagination from the nasal cavity, and a subsequent absorption of the cancellous bone tissue, the diploe. In case of the ethmoidal cells, we find that each of the lateral masses of the os ethmoidalis has one osteogenetic center, which appears about the fourth or fifth month in the region of the os planum, and that from these centers are formed the laminae around the air cells which are complete at birth. These laminae are entirely ossified about the fourth or fifth year. (Cunningham.) So here the absorption of diploe does not take place.

Nearly all authors agree that the sinuses increase in size till puberty or up to about twenty years, at which period they reach their full development. (Treves, Combe.) According to the same

men, large sinuses are mostly found after the twentieth year, and it certainly cannot be doubted, but that there is an enormous increase in the size of the frontal sinuses about this time. But that does not complete the growth of the sinus, for we find that after a period of fifteen or twenty years of rest, the sinus commences again to increase in size, but this time it is not due to the primary unknown cause of its formation, or to the different changes which puberty brings along with it, but to the internal plate of the frontal bone, (as in case of all the bones entering into the formation of the cranial cavity), following the cortex of the brain, which is moving away from it. For the brain begins to slightly decrease in size at this period, which falls between 38 and 42 years, on account of the senile changes (senile atrophy), while the external table of the skull retains its shape. So we might conclude from this that we may expect to find the largest and best developed sinuses in men who are passed 40, and especially in the aged.

In observing, inspecting and dissecting the heads of some of the lower animals, especially with reference to the frontal sinuses, I found a great many points which are of interest. The first peculiarity I noticed was in the skull of a female hound. It consisted of a middle set of frontal sinuses, which were located just above the root of the nose, let us say, above and behind the nasal spines of the frontal bones. They were distinctly separated by sagittal septae from the lateral set, which is ordinarily present. To make it plain, it seemed as if this middle set of cells was developed within the median septum, which in most cases is found to separate the frontal sinuses. The posterior part of the sinuses was divided by a coronal septum.

These sagittal and coronal septae are also frequently present in human skulls.

THE THREE SAGITTAL SEPTAE OF THE SINUS FRONTALIS IN MAN.

It is possible to recognize at least three septae, an external, a middle and an internal, extending in a sagittal direction, which, when present, are fairly constant in shape, position and extent, especially in the vital type of the lower animals and man. They have individual characteristics by which they can be identified; but all three have the following points in common: 1. They have the appearance of being formed by an invagination of the thin, bony wall of the sinus. 2. They extend downward and backward parallel to the sagittal median plane of the head. (The external one extends mostly a little outward or inward in addition to backward.)

The Internal Sagittal Septum.—This septum seems to be complete in 98% of all cases and corresponds to the internal wall of the sinus proper in the mental and motor types.

In the cases where an internal accessory sinus is present (mostly vital types) it seems as if the internal wall was moved outward to the place where we usually find the middle sagittal septum and that a new internal sagittal septum is formed, which in these cases corresponds to the internal wall of the internal accessory sinus. A fact which speaks in favor of this is, that it is mostly the space between the middle and external sagittal septae, which is drained directly by the infundibula.

Fig. 1. Skull of Motor Temperament. (Male.) No Frontal Sinuses.

In some of the lower animals we find the space between the two sinuses filled with diploe, and there we can see readily that this space corresponds to the location of the internal accessory frontal sinus of the human. The two internal sagittal septae can be looked upon clinically as being located in the median sagittal plane of the skull. They are united with each other for their middle three-fifths in such a manner as to form the middle septum between the right and left bony sacs. The upper one-fifths are separated from each other, but the space between them is filled in by diploic cells. They can be chiseled away carefully, so as to show an antero-posterior

groove between the upper parts of the left and right sinuses. For the lower one-fifth of the extent of these septae, we find that they are separted by the upper part of the perpendicular plate of the ethmoid bone, which is attached to both of them in such a manner as to compel them to assist in the formation of the internal parts of the upper boundary of the infundibula. The septae are triangular in shape and can be said to have a base, which is closely attached to the upper part of the perpendicular plate of the ethmoid, an anterior border which is continued forward and outward into the anterior wall, and a posterior border which is continued backward and outward into the posterior in two cases out of 100.

The Middle Sagittal Septum.—This septum is quite frequently present in some of the lower animals, where it can be seen to separate an internal accessory sinus from the sinus proper.

In human beings it is in most cases located about midway between the internal sagittal septum and the supraorbital notch, frequently a little more internal. Occasionally this septum is very close to the internal sagittal septum, and then a very small internal accessory sinus is present. If this septum is absent, then a ridge mostly takes its place, which is generally well marked near the anterior and occasionally on the posterior wall. This septum presents the true internal wall of the sinus proper, and I found it complete in one case, where it was located internal to the upper opening of the infundibulum.

The External Sagittal Septum.—This septum is very frequent in vital types and is mostly located at or external to the supraorbital notch. As far as my observations go, it cannot be called a complete septum, because I have never seen it touch the floor of the sinus, in fact its inferior border always seems to be free and frequently concave from before barkward. As said before, it is formed by an invagination from the the anterior wall, and consequently it is much thicker at this point. In some cases it is possible to chisel out a little groove on the anterior surface of the bony sac of the sinus (by removing the diploe carefully), which corresponds to the place where the anterior surface became invaginated, in order to form this external septum. This septum is frequently triangular in form, and has frequently a very sharp apex. This septum, when present, forms the external wall of the sinus proper and the internal wall of the external accessory frontal sinus.

THE CORONAL SEPTUM OR THE TRUE POSTERIOR WALL OF THE FRONTALIS PROPRIUS.

If the coronal septum is present, than a posterior supplementary part of the sinus can mostly be made out behind it, and it must be remembered that this septum should be looked upon as the true posterior wall of the sinus proper and going a little farther, I may say that it is to the interest of every surgeon who has to deal with

Fig. 2. A Female Skull. (Vital Temperament.) Showing all the peculiarities described in this paper, except the Superior Accessory Frontal Sinus.

a Right Internal Sagittal Septum. (Perforated.) *b* Right Median Sagittal Septum. (Complete in this Case without Perforations.) *c* Right External Sagittal Septum. (Incomplete.) *d* The Right Coronal Septum. *e* The Inferior or Free Margin of the Right Coronal Septum. *f* The Right True Frontal Sinus. *g* The Enormously Enlarged Right Internal Accessory Frontal Sinus, which does not drain into the Right Infundibulum and which is entirely closed of from the Right True Sinus by the complete Right Median Sagittal Septum. *h* The Right External Accessory Frontal Sinus. *i* The Anterior Opening of the Right Posterior Accessory Frontal Sinus. *j* Location of the Upper Opening of the Right Infundibulum. *k* The Left Bulla Frontalis. *l* Location of the Upper Opening of the Left Infundibulum. *m* The Left True Frontal Sinus.

frontal sinuses, to inspect this posterior wall in cadavers of the lower animals as well as in men, in order to be able to appreciate its form and peculiarities, as far as the presence or absence of the posterior supplementary sinus is concerned.

In a great many cases in which the coronal septum is present (see table) we see at once the peculiar makeup of the posterior wall, which extends downward parallel to a coronal plane of the head. We see a curved line extending upward and outward from the postero-internal angle of the sinus which is located a little behind the middle of the internal margin of the upper opening of the infundibulum. The convexity of this curved line corresponds to the concave or free margain of the posterior wall of the sinus. The concavity of this curved line is either filled in by a thin lamina of bone, extending in the same direction as the posterior wall just mentioned, or it presents a free semilunar margin which seems to form the upper boundary of a communication between the sinus proper and the posterior accessory frontal sinus. The relation of this opening to the upper opening of the infundibulum is peculiar. The opening of the infundibulum points downward and backward, whereas this one could give passage to anything which passes just above the upper opening of the infundibulum in an antero-posterior direction.

The similarity between the posterior wall of the sinus in dogs and this peculiar coronal septum in men is very striking, it has the same shape, the same appearance and, in some cases, the same extent. In some cases, it is rudimentary, as in some of the lower animals. If we find an opening just below the free margin of the posterior wall of the sinus in men, then it can be seen by anybody that there is a cavity behind the large septum, but if this concave margin is filled in by bone, then the question arises, is there an accessory cavity, or is the cranial cavity behind the septum? This is, of course, a very important question to the surgeon. The upper opening should be inspected closely in these cases. If the thin bony lamina, which extends downward from the inferior or free margin of the coronal septum, should slant downward and backward, so as to become attached to the posterior margain of the upper opening of the infundibulum, that is, if we are unable to find the lower margin of this thin, bony lamina to be free at this place, then the utmost caution is necessary, as far as perforating the posterior wall of the sinus is concerned, because you may open up the cranial cavity. In some cases I found this lamina to be perforated by small openings, and whenever they can be made out distinctly, then you can expect an accessory cavity behind the septum. There is another variety, in which this portion of the posterior wall forms a little bony pouch with its concavity forward, in other words, the thin bony lamina

seems to be pushed backward and a little upward in such a way as to form a distinct roof above the posterior part of the upper opening of the infundibulum. This, of course, gives the inferior margin of the coronal septum the appearance of the inferior or free margin of this septum, which we found in some of the other specimens, and so you can readily see that it is absolutely necessary to pass a probe, though carefully, through the communicating opening before this posterior wall is attacked. If the little pocket I just spoke of is found to be present, then in some cases on careful examination with a small probe, we may be able to find some small openings on its external wall, which extend into the posterior accessory frontal sinus, if not, then either the anterior ethmoidal cells or the cranial cavity are behind it. According to the accompanying table you will find that it is safe to chisel through the thin bony lamina in 85% of all the vital types, in 19% of all the motor types and in 10% of all the mental types. In some cases a bulging can be noticed just above the upper opening of the infundibulum, which corresponds to one of the anterior ethmoidal cells and is mostly called the frontal bulla.

Now then, it is true that whenever this coronal septum is absent, its position is always indicated by a transverse ridge. Whenever this coronal septum is present it is always located exactly where we should expect to find the posterior wall of the sinus proper. In fact, when complete, nothing is seen in this locality except this septum, and it is also true that whenever this septum is nearly complete, there always is a cavity behind it. Whenever the cavity behind the coronal septum is present, this cavity is found (especially in man), to extend backward over the orbit, or better say over the inferior lamella of the horizontal portion of the os frontalis. In short, if you are able to make out a distinct transverse slightly curved ridge in the postero-superior part of the sinus proper, then the posterior wall can not be formed by the coronal septum, on account of its absence and consequently the posterior accessory sinus is either absent or open, even if the lower part of the posterior wall has the appearance of the lower part of the coronal septum. If, on the contrary, the coronal septum is present, then the transverse ridge in the postero-superior part of the sinus proper is absent; and if the lower part of the posterior wall has the peculiar markings of the coronal septum, then in these cases we can reasonably suspect the presence of the posterior acsessory frontal sinuses. Up to now I have spoken mainly of the vital type, on account of having found the

most extensive posterior accessory frontal sinuses and sagittal and coronal septae in this type, but, of course, as you can see from the accompanying tables, they are also found in the other types. In fact, the motor type seems to have them more frequently than the mental type. I would like to state that I have never seen a case where the posterior accessory sinus extended as far back as the optic foramen (Sir Logan Turner's paper), but I have seen quite a few cases where the bony sac of the posterior accessory sinus was entirely blended with the superior and inferior lamella of the horizontal portion of the frontal bone, but even in these cases it is possible to find the most posterior part of the bony sac, which very frequently corresponds to a very thin lamina of bone, separating the posterior accessory sinus from the anterior or sometimes the middle ethmoidal cells. On close inspection of a sagittal section of one of these cases it is only too plain that the upper and lower extremities of this bony septum just mentioned are bent forward on account of corresponding to the most posterior part of the bony sac of the posterior accessory sinus. In one case I found it perforated, so that there was a distinct communication between the posterior accessory sinus and the anterior ethmoidal cells. The ethmoidal cells were very large in this case, at the same time I could not look upon them as belonging to the posterior accessory frontal sinus, because they did not enter into the formation of the bony sac of this sinus. In the most posterior part of the bony sac of the posterior accessory sinus, there is frequently a transverse ridge, which is formed by the bony canal for the anterior ethmoidal vessels and the nasal nerve.

BOUNDARIES OF THE POSTERIOR ACCESSORY FRONTAL SINUS.

Anterior.—The posterior surface of the coronal septum.

Superior.—That part of the bony sac of the posterior accessory sinus, which is in relation to and mostly blended with the superior lamina of the horizontal part of the frontal bone.

Posterior.—That part of the bony sac of the posterior accessory sinus which is in relation to the anterior or middle ethmoidal cells, or the superior lamella of the horizontal part of the frontal bone, (in case the superior and inferior lamella of the horizontal part of the os frontalis blend just behind this part of the sinus.)

Inferior.—That part of the bony sac of the posterior accessory frontal sinus which is in relation to, but mostly blended with the inferior lamella of the horizontal part of the os frontalis and near

the median line with the upper parts of the anterior and middle ethmoidal cells.

Internal.—That part of the bony sac of the posterior accessory sinus which is in relation to the superior lamella of the horizontal plate of the os frontalis, where it forms the lateral boundary of the fossa which lodges the olfactory bulb.

External.—That part of the bony sac of the posterior accessory sinus which is in relation to or blended with the line formed at the external part of the sinus by the junction of the superior and inferior lamellae of the horizontal portion of the os frontalis.

BOUNDARIES OF THE SINUS FRONTALIS PROPRIUS.

By the term, "True frontal sinus," I understand a frontal sinus, as it is frequently found in the lower animals and in the mental type of man; bilateral, pear-shaped and not divided by septae, not extending backward more than one-half inch or even less, not farther outward than the supraorbital notch, and being separated from its fellow on the opposite side by its internal wall and diploe.

When the septae are present, then the cavity between the middle and external sagittal septae, being inferior to the coronal septum, may be looked upon as the true frontal sinus, on account of the occasional presence of the internal and the frequent presence of the posterior accessory frontal sinus.

Occasionally we find one large sinus on each side of the median line, which extends outward as far as the junction of the middle with the outer one-third of supraorbital ridge, but upon close examination, we are mostly able to find rudimentary middle and external sagittal septae, and also a rudimentary coronal septum, indicating the extent of the sinus proper.

In 60% of all vital types we find beginnings of sagittal septae (external to the lateral sagittal septum) extending backward and possibly a little outward from the anterior wall, so that if pus should be present in the sinus, they would form small shelves or, as in some cases, small pockets from which the pus does not have any way of escape, except by flowing around the posterior or inferior free margin of these sagittal septae. This is mostly possible, on account of the floor slanting toward the upper opening of the infundibulum, but it happens in some cases that the floor is not slanting, and the result is that the pus can not leave these places.

THE EXTERNAL ACCESSORY SINUS OR SURGICAL POCKET OF THE SINUS FRONTALIS.

This pocket corresponds to the most external and anterior part of the sinus frontalis and being frequently pyramidal in form, can be said to have a base, an apex, an anterior, a posterior and an internal wall. The presence of this pocket depends entirely upon the presence of one or both of the following factors: 1. Upon the floor in that region being depressed in such a way as to prevent drainage. 2. Upon the presence of a sagittal septum in the region of the supraorbital notch. When this septum is present then we should have three sagittal septae, an internal, a middle and an external sagittal septum.

The Base.—It is the lowest part of the pocket and corresponds to that portion of the floor, which is external to the external sagittal septum. Its external part is mostly higher than its internal, but frequently it is the reverse, especially if a large and distinct supraorbital canal is present. The most external part of the base, which corresponds to the junction of the anterior and posterior walls of this small surgical space is mostly turned up a little, so as to present a round corner.

The Apex.—Corresponds to the junction of the anterior, posterior and internal walls, and is located external to, but at the upper part of the inner wall. It is placed at this point on account of the internal wall when present, being the only vertical one of the pyramid.

The Anterior Wall.—Is formed by the posterior surface of the anterior part of the bony sac of the sinus. Anterior to that we generally find a little diploe, which separates it from the external plate of the vertical portion of the os frontalis. In some cases the diploe is absent and then the sac is blended with this part of the frontal bone. Frequently small additional external sagittal septae extend backward from the posterior surface of the anterior wall. In some cases, the external frontal diploic vein is found to wind its course through the diploe just anterior to the most external part of the anterior wall of the pocket.

The Posterior Wall.—If not incomplete (as far as the pyramidal shape is concerned), is mostly formed by the postero-external part of the bony sac of the sinus. Its most external part is always concave from side to side and frequently also from above downward. This is probably due to it being the most external part of the sinus.

The angle which is formed at this point between the anterior and posterior surface is not definite, in fact it is rounded off. In some cases the coronal septum, which I shall mention in detail afterward, forms a part of this posterior wall. This wall, as well as the anterior one, is not vertical, but slightly sloping toward the apex.

The Internal Wall.—As said before, the internal wall corresponds to the external sagittal septum, probably the most marked one of a few external sagittal septae which is mostly located just above the supraorbital notch. It is frequently absent (see tables), and then, of course, the surgical importance of the space would depend upon the character of the floor, but when present it can be said to have nearly the same make up as the middle sagittal septum. I have never seen it complete, and it frequently seems to be poorly developed. Its anterior margin is, of course, firmly attached to the posterior surface of the anterior wall of the sinus, but in some cases nothing else but a bony ridge, which is well marked on the posterior as well as on the anterior wall, indicates the location of the internal wall of this pocket.

In a horizontal section, we can see plainly that this external sagittal septum consists of, and is formed by a folding in of the anterior wall of the bony sac of the sinus. Whenever present, its posterior or postero-inferior border is always concave and its anterior extremity reaches a little farther downward than the posterior. These septae and, of course, also the spaces, seem to be more frequent in the vital than in the mental or motor types.

BOUNDARIES OF THE INTERNAL ACCESSORY FRONTAL SINUS.

In some of the lower animals the right and left frontal sinuses are naturally widely separated, and the septum between the two consists of the thin but dense internal part of the bony sacs of the sinuses with diploe and the interfrontal suture interposed. In such a case in the human we should have a pair of true frontal sinuses; but, in some of these cases, the diploe of this thick septum between the two becomes hollow, leaving the internal wall of the true sinus in place, but forming a new sinus internal to it and we would have an internal supplimentary or accessory frontal sinus. Frequently the internal wall of the sinus proper, or the middle sagittal septum, which is the same, is not present and then it seems as if the true sinus extended up to the interfrontal suture, but the findings in the lower animals reveal the truth. The boundaries of the internal supplementary sinus, even if not always present, would be:

Anterior.—The anterior wall of the bony sac of the sinus.

Internal.—The internal sagittal septum.

Posterior.—The coronal septum or the posterior wall of the bony sac

External.—The middle sagittal septum.

The internal accessory sinus is frequently met with in vital types of man, sometimes it is very small and incomplete and located internal to the upper opening of the infundibulum, but always anterior to the coronal septum whenever this is present. Two small pockets, one in the base of the crista galli and one in the frontal spine, when present, frequently open into it.

I did not find frontal sinuses in the skulls of swallows, wild ducks, wild geese, the heron, the mink or the muskrat. In the skull of a large species of owl I found that the cells were pretty well developed and of a peculiar makeup; in the dog they were also well developed, while in the stag they were not very large, and in the hog, the ox and the buffalo, I found them to be much larger. So the sinuses are absent in certain of the animals. If we reflect for a moment what the inherited qualities are of these animals, which I have examined, that is, so far as their temperaments are concerned, then we are struck at once by the fact that those animals which naturally exhibit steady and rapid motions, and whose general makeup leads us to classify them as motor, are the ones which do not have any, or at least have the smallest sinuses, and that in the ones which are much slower in exercising their muscular strength and whose general makeup leads us to classify them as mental or vital temperaments the sinuses are much larger.

As said before, the swallow, the wild duck, the wild goose and the muskrat have no cells, the owl, which certainly can be called lazy, has pretty fair-sized cells, which are supposed to be much greater than the ones of the active eagle; while the fox (motive-mental temperament) and the hog (vital temperament), have much larger calls than the stag. Now, if these observations as to the respective sizes of sinuses in the different types of animals are correct, we can expect the same observations to be true in the sinuses of the different human types, and upon examining some of the human skulls in my collection, which I classified as belonging to motor types, to my own satisfaction I found that the same thing holds true for human beings.

Frontal sinuses are largest in the vital temperament of man.

Frontal sinuses are of fair size and mostly symetrical in the mental temperament of man.

It is a difficult matter to state what would constitute a normal frontal sinus in man, because the variations in size, shape and extent seem to differ in different individuals, and even in the same individual a difference between the right and left sinus can be appreciated; but that does not take away the fact that the development of the sinus is in close relation to the general proportional makeup of man.

PECULIARITIES FOUND IN THE LOWER ANIMALS.

1. Absence of frontal sinuses in some of the lower animals.

2. The median septum is formed by the internal walls of the left and right frontal sinuses (in all animals).

3. The presence of a median sagittal septum in all animals.

4. The presence of a lateral sagittal septum in some. (See table.)

5. The presence of an internal accessory frontal sinus. (See table.)

6. The presence of a coronal septum in some. (See table.)

7. The presence of a rudimentary posterior accessory frontal sinus in some. (See table.)

8. The presence of large diploic cells above the sinuses, between the two tables of the frontal bone. (Cow and buffalo.)

9. The frontal sinuses communicating distinctly with the diploic spaces between the two layers of the calvarium. (In the cow and buffalo.)

10. The supraorbital canal forming a distinct ridge in the outer part of the anterior wall of the sinus. (In all hog skulls.)

11. The presence of a rudimentary external sagittal septum. (In some dogs.)

FINDINGS IN FIFTY CAT SKULLS AND FIFTY DOG SKULLS.

	Cat Skulls.	Dog Skulls.
Only a left frontal sinus	5	0
Only a right frontal sinus	5	0
No frontal sinuses	0	0
A median sagittal septum	50	50
A left lateral sagittal septum	17	24
A right lateral sagittal septum	21	24
A left and a right lateral sagittal septum	17	24
A left median cell or internal accessory frontal sinus	17	24

	Cat Skulls.	Dog Skulls.
A right median cell or internal accessory frontal sinus.	21	24
A right and left internal accessory frontal sinus.....	17	24
A well developed left coronal septum.....	21	24
A well developed right coronal septum.....	16	24
A well developed left and right coronal septum.....	16	24
A rudimentary left coronal septum.....	32	21
A rudimentary right coronal septum.....	33	18
Rudimentary left and right coronal septae.....	32	18
Well developed posterior accessory frontal sinuses...	16	24
Rudimentary posterior accessory frontal sinuses.....	33	18
A ridge in one or both of the sinuses, caused by the supraorbital canal	0	0
A rudimentary external sagittal septum.....	0	21

The frontal sinuses seem to be more frequently smaller or absent in the male than in the female animals. (Motor and mental temperaments).

SUMMARY OF THE MAIN FINDINGS IN ONE HUNDRED HUMAN CADAVERS.

1. The pear-shaped sinus, having no septae and no accessory sinuses, which is frequently present in some of the lower animals and sometimes in mental types of human beings, represents the sinus frontalis proprius of men.

2. The sinus proprius frequently communicates with supplementary or accessory sinuses and then its walls would, of course, be transformed into septae.

3. All the septae are frequently rudimentary in human skulls.

4. All the accessory frontal sinuses, whose distinctness depends upon the clear demarcation of the septae are consequently rarely well marked in one skull. (See Fig. 2, where everything but the superior accessory sinus is present.)

5. I recognize a coronal septum, which is mostly incomplete at its lower end, which in the frontal sinus of some of the lower animals extends downward and a little forward from the anterior surface of the posterior part of the bony sac of the sinus and which corresponds to the transverse or coronal septum in men. I take this septum to represent the true posterior wall of the frontal sinus proper in men as well as animals. This septum is either represented by a semilunar ridge, extending in a transverse direction in the postero-superior part of the sinus, or a short or long transverse septum, which is incomplete in its most inferior part, which corresponds to the posterior wall of the sinus proper, and which has

characteristics, indicative of the presence or absence of the posterior accessory frontal sinus.

6. I recognize three sagittal septae, as being fairly constant, especially in the vital type, an internal (the one in the median line between the two frontal sinuses), a middle (lateral or median sagittal septum), and an external (external sagittal septum), the latter being the least constant of the three.

7. Frequently an internal set of accessory frontal sinuses is present, on account of the middle sagittal septae being complete, especially in vital types.

8. Occasionally a superior accessory sinus is present, mostly in thick skulls.

9. Frequently a posterior accessory sinus is present, especially in vital and mental motive types.

10. Frequently an external accessory sinus is present, presenting mostly a definitely outlined space or pocket at the external part of the sinus proper, which is important on account of pus retention.

THE EXAMINATION OF 100 HUMAN CADAVERS REVEALED THE FOLLOWING POINTS IN CONNECTION WITH THE FRONTAL SINUSES.

Unclassified.	Mental types.	Motor types.	Vital types.	
100	16	64	20	
58	4	51	3	Had diploe between the anterior part of the bony sac of the sinus and the anterior part of the vertical plate of the frontal bone.
0	0	0	0	Had only a left frontal sinus.
0	0	0	0	Had only a right frontal sinus.
20	0	20	0	Had no frontal sinuses. (Every one of the 20 had a dilated upper part of the infundibulum.)
80	16	44	20	Had internal sagittal septae. (See 20% which had no sinuses.)
2	0	2	0	Had perforated internal sagittal septae.
23	2	8	13	Had a left median sagittal septum. (Well developed or rudimentary.)
23	2	8	13	Had a right median sagittal septum.
23	2	8	13	Had a left median cell or internal accessory frontal sinus.
23	2	8	13	Had a right median cell or internal accessory frontal sinus.
23	2	8	13	Had a right and left internal accessory frontal sinus.
32	2	13	17	Had a well developed left coronal septum.
32	2	13	17	Had a well developed right coronal septum.
32	2	13	17	Had well developed left and right coronal septae.
32	11	19	2	Had a rudimentary left coronal septum.
32	12	18	2	Had a rudimentary right coronal septum.

Unclassified.	Mental types.	Motor types.	Vital types.	
31	11	18	2	Had rudimentary left and right coronal septae.
32	2	13	17	Had a well developed left posterior accessory frontal sinus.
32	2	13	17	Had a well developed right posterior accessory frontal sinus.
32	2	13	17	Had well developed left and right posterior accessory frontal sinuses.
32	11	19	2	Had a left rudimentary posterior accessory frontal sinus.
32	12	18	2	Had a right rudimentary posterior accessory frontal sinus.
31	11	18	2	Had a left and right rudimentary posterior accessory frontal sinus.
1	0	1	0	Had a plainly marked superior accessory frontal sinus.
1	0	0	1	Had a ridge, in one or both of the sinuses, caused by the supraorbital canal.
22	3	7	12	Had a well developed external sagittal septum.
14	2	4	8	Had a rudimentary external sagittal septum.
30	2	10	18	Had an external accessory frontal sinus.

METHOD OF OPENING THE FRONTAL SINUS.

(As far as the anatomical facts are concerned.)

This depends greatly upon the diagnosis arrived at, as far as the temperament of the subject is concerned and the probable extent of the sinuses, but the following points are of value for routine work in most cases.

1. As to the presence or absence, as to the size and extent of the sinuses, no matter what the external findings may be, it is possible to be mistaken in a small per cent of the cases.

2. Never use a trephine, but only a small chisel and a mallet. In a great many cases, especially vital types, it is possible to open the sinus nicely, simply by the use of the chisel, much as the dentist enlarges the cavity of a tooth with a small chisel, without the use of anything else. This certainly does away with the profound jarring, which can not be avoided by other methods.

3. Begin your chiseling in every case at the antero-internal part of the inferior surface of the sinus. This would be a little anterior to the point to which Sir Logan Turner applies the electric bulb for transillumination. The point I have in mind is located one-half inch horizontally outward from the nasion anterior and above the internal angle of the frontal bone, and is at an equal distance from the nasion (½ inch—12½ mm.) and from the internal canthus of the rima palpebra. (½ inch—12½ mm.)

Do not go too high up or too far back, for fear of injuring the trochlea of the muscularis obliquus superior, which, according to H. P. Mosher, M. D., (see *Boston Medical and Surgical Journal*, September 7, 1905), is located ¾ of an inch (18mm.) from the median line; ¼ inch (6mm.) nearer the median line than the supra-orbital notch or foramen, and ¼ inch (6mm.) below it.

4. Cutting through the external dense layer of bone, you will either strike diploe (motor type) or go right into the sinus. (Vital type.) If you should strike diploe watch carefully and see if the diploic cells are getting smaller at a depth of three mm. If the cells are getting smaller, then you come to a dense lamina before or at this depth, which corresponds to the anterior part of the bony sac of the true sinus. You simply found diploe between the anterior lamella of the vertical plate of the frontal bone and the anterior part of the bony sac of the true sinus. If the diploic cells do not get smaller at a depth of 3mm., then direct the chisel downward, inward and backward, in order to strike the middle set of cells if present, because continuing to chisel backward would lead to the cranial cavity, the diploic cells would be getting smaller at a depth of probably 5mm. in these skulls, at the same time the dense lamina you would come to, would correspond to the tabula vitra.

5. Cut away enough, so as to be able to inspect the entire posterior and inner walls of the sinus proper.

6. Study the posterior wall for indications of the presence of the posterior accessory sinus.

7. See if the internal wall corresponds to the location of the interfrontal suture or median sagittal plane, if not, expect the presence of an internal set of sinuses.

8. Probe the roof carefully, in order not to miss the superior accessory sinus if present.

9. Inspect the most external part of the sinus proper for the external accessory sinus or surgical pocket mentioned in this paper.

I have read with interest Dr. Cryer's article on frontal sinuses in the *American Medical Journal* of January 26, 1907, and I would like to point out, that a great many points in this paper can be verified by the text and cuts of his paper, even though the article came too late to be of special use to me.

1505 W. 9th St.

CEREBELLAR ABSCESS FOLLOWING ACUTE SUPPURATION OF MIDDLE EAR. OPERATION. DEATH. AUTOPSY.*

BY W. D. BLACK, M. D., ST. LOUIS,

While the subject of cerebellar abscess is not new, I believe that the reporting of cases to a general society often brings out many new points in the discussion. Cases which result favorably often give the author or operator more satisfaction, but less real knowledge, than those which terminate fatally, where an autopsy is allowed. This case that I will report has many points of special interest, and I earnestly hope the discussion will be general, so that all of us may gain additional knowledge of a still imperfectly understood subject.

History.—Oct. 18th, 1905, I was called by the attending physician to examine patient, who was a boy 14 years old, white, of medium build, with a history of having had no constitutional disease with the exception of neuralgia and severe cold in the head, which had caused acute suppuration in his right ear, and which had existed for two weeks, followed by recovery. This was about one year prior to the present illness. The present attack had existed about four weeks before I saw him. The attending physician called me because of the boy having a headache on the right side. The pain was very severe, being first noticed above the ear and radiating to the frontal region. The physician informed me that the patient had from one to two degrees of fever at first, but when the ear began discharging the temperature fell to normal. When I first saw him, the patient had been vomiting for several days and complained of vertigo on moving. The pulse ranged from 60 to 70, full, strong and slightly irregular, missing a beat occasionally. Pain in the head was almost constant and more noticeable in the frontal region. Bowels regular, but a tendency to constipation. Patient drowsy and sleeping most of the time. Later the attendants found it more difficult to arouse him than when he was first taken ill. No delirium.

Examination.—No tenderness or swelling over the mastoid region. Walls of the external auditory canal swollen, making it impossible to see the tympanic membrane, at the entrance of canal, a

* Read before the Eleventh Annual Meeting of the American Academy of Ophthalmology and Oto-Laryngology, St. Clair, Mich., August 30, 31 and September 1, 1906.

furuncle developed, partially blocking the lumen of the canal. The auricle itself normal. Discharge from canal small in amount and very offensive. Patient was very ill and I omitted the customary tests for hearing. Loud conversation could be heard, but not very well. The attending physician and myself strongly suspected intracranial complication, but decided to wait a day or two and treat patient on the expectant plan. I ordered an ice-bag to the head and hot carbolized douches with fountain syringe for ear, to be used every three hours. At the expiration of twenty-four hours the patient seemed better; swelling of the canal wall much less. Pain about the same. Discharge from the ear a little more profuse. General condition worse. I decided to perforate the tympanic membrane and an anesthetic was given. I made a crucial incision in the membrane, sacrificed canal walls, opened the furuncle, packed lightly and applied heat externally. Next day the discharge was greater in amount with little odor, and the canal walls almost normal. General condition worse, although vomiting ceased for a time. Examination of the viscera showed that they were normal. Urine decreased in amount, showing a trace of albumin and a few granular casts. Intestines more difficult to move, with a tendency to impaction. Examination of the eyes showed no strabismus, pupils reacted normally, no fundas changes. No rigidity of muscles of neck and no retraction of head. Slow cerebration. This latter symptom was very marked. We were now almost positive we had an abscess to deal with and advised operation. Parents agreed, and the patient was taken to the hospital. This was five days after first seeing the case.

Oct. 22nd, 1905. Patient was prepared in usual manner, and a Swartze-Stacke operation performed. Entering the antrum was quite difficult, owing to the compact bone, although it was not sclerosed. Antrum contained three or four drops of pus. The walls of the antrum were apparently healthy. I now worked backward, enlarging the opening, and exposed the sigmoid sinus for two-thirds of an inch. Found sinus of good color, compressible, and from the healthy bone around it concluded that opening it was unnecessary. General symptoms did not appear like those you expect to find in sinus thrombosis. The next step in the operation was making an opening one and one-fourth inches in diameter, one and one-fourth inches behind and one and one-fourth above the external auditory meatus. Dura of good color and brain pulsated normally. Incised dura almost the entire width

of opening and inserted trocar and cannula in every direction to a depth of from one to two and a half inches, especially along the tegmen tympani, but found no pus. Inserted a small piece of selvage edge gauze within the cerebrum for about two inches. Upon the urgent solicitation of the attending physician, the dura was left open. I carefully packed the brain wound from the mastoid opening and then brought the edges together and stitched, leaving the lower one-fourth inch open for drainage. The patient's condition at this time was not good, and it was decided to delay opening the cerebellum for a day or two. The patient was put to bed and stimulants given. Time of operation was two hours, the delay being caused by having to work with coal oil lamp. The temperature the next three or four days ranged from 98 to 98.4°. No vomiting. Pulse regular, 76 to 78. Respirations, 18 to 20. Removed the wick from the cerebrum and dressed the mastoid wound on the second day. Wound looked healthy. Brain substance protruding slightly through opening in skull. No pus in either wound.

October 25th. (Three days after operation.) Pulse 74, good, no irregularity; respiration, 18; no vomiting, no headache; tongue clean; facial expression good; patient answers questions readily, and hears low conversation. For the next seven days improvement was marked and all organs functionated normally. Patient stated he felt well enough to go home. Wound dressed every other day. Brain prolapse grew larger regardless of firm pressure with bandage. This prolapse grew to the size of a walnut and then became stationary. About the thirteenth day after operation the patient became restless and all the symptoms which existed prior to operation returned. Wound looked healthy, but prolapsed brain tissue began to soften and break down. Owing to the patient's improvement we began to doubt our original diagnosis, and thought we might be dealing with a case of serous meningitis, but with the return of the symptoms we determined to relieve the brain prolapse first and then explore the cerebellum.

Operation for Brain Polapse. Nov. 6th. (Fifteen days after first operation.) Split scalp for one-half inch above upper edge of wound and extended towards the bregma. We next broke the adhesions which existed between the brain tissue and that of the scalp, which, by holding the brain prolapse from protruding still farther, caused the return of symptoms by not allowing the relief of increased intracranial pressure. Tied off the brain prolapse as

close to its base as possible and cut with scissors. Cut a small artery which was difficult to ligate, but the hemorrhage was controlled by suturing the periosteum, cutting out the piece, and then cauterizing with actual cautery. I now cut a piece of silver screen slightly larger than the opening and placed it in position, using as little force as possible. I next made a flap of periosteum and cellular tissue on each side and sewed them together, leaving a small opening at the lower angle of the wound, then brought the muscular tissue over this and stitched. Time, one hour and five minutes. While I was preparing to make the opening for the exploration of the cerebellum, the patient gave a peculiar gasp, a kind of long-drawn sigh, when respiration suddenly ceased. It seemed like a sudden paralysis of the diaphragm. Artificial respiration performed. Pulse fast and weak. Hypodermoclysis given, heart stimulants used, and patient put to bed. Artificial respiration was used continuously, although breathing had ceased entirely, and this procedure was kept up for six hours, when cardiac action ceased.

Post-Mortem Findings.—Cerebrum. Dura everywhere injected, but few adhesions were found. Sections made in all directions and medulla and pons cut in small transverse sections. At the site of the opening in the skull the brain tissue was softened; otherwise the cerebral tissue looked normal. The lateral ventricles were apparently larger than normal and contained considerable serum.

Cerebellum. On making an incision in the right lobe of the cerebellum, an abscess about the size of a hickory nut was discovered, containing about one-half ounce of thick greenish and yellowish pus, and situated about the center of the right lateral lobe. It seemed to have no connection with the lateral sinus.

In conclusion, there are a few points of interest I would call your attention to:

1. Mode of infection.—I believe the infection occurred through the lymphatics, as the sigmoid sinus and the osseous walls around it were healthy.

2. Doubt of correctness of original diagnosis after first few days following operation.—All previous symptoms disappeared and only returned when brain prolapse became adherent to surrounding tissue.

3. Rarity of cerebellar abscess in acute suppurations of middle ear in children.—This is very uncommon, and when it does occur is usually from direct extension of infection backward.

4. Kind of infection.—Bacteriologist made no report.

5. Cause of death.—Compression of brain due to the closing of the opening, thereby increasing the already great intracranial tension, causing paralysis of the center of respiration.

6. Silver fillet in brain surgery.—The use of this is, in my opinion, not advisable, owing to the difficulty of placing it in position and also owing to its wide meshes allowing the brain tissue to protrude.

1411 California Avenue.

Clinical Reports. SIGISMUND SZENES. *Arch. f. Ohrenh.*, Leipzig, December, 1904.

1. The patient, male, 40 years old, had suffered for three years from a number of ulcerated growths on the auricle, which upon removal, proved to be giant-celled melanosarcoma. The patient eventually died of tuberculosis.

2. A man, 71 years old, had a number of separate warty growths involving the whole of the auricle. They were painful and ulcerated and bled easily. They had existed for six years and cystic degeneration had taken place. Microscopic examination showed that the growth was epitheliomatous.

3. A woman, 50 years of age, had suffered for many years from otorrhoea. When this subsided the canal became obstructed by a hard growth, which arose from the posterior and external walls. After separating the auricle, the growth was found to consist of a mass of bone, as large as a walnut, movable, but imbedded in a deep depression in the posterior wall. The author calls it a "free osteoma."

4. The patient, a girl 23 years old, who had previously suffered from hysteria, had an attack of acute middle ear suppuration. She suffered from intense headache and vomiting and other symptoms which led to the suspicion of intracranial complications, but eventually, the alarming symptoms proved to be hysterical.

YANKAUER.

AN INSTRUMENT FOR THE APPLICATION OF A DISC TO PERFORATIONS OF THE EAR DRUM.*

BY J. WINTER WAMSLEY, M. D., PHILADELPHIA.

The use of discs to cover perforations of the ear drum is not new in itself. Paper has generally been used for this purpose, but within this article is a description of an instrument which is convenient for applying discs of any material and particularly discs of black court plaster, which has been found by the author to be of the best advantage. The object of using black is that it can be better seen. The application of discs was in its original experiment used for the purpose of increasing hearing, and in some kinds of cases it did prove of a certain advantage. In using discs made of court plaster, the adhesive nature of the plaster made its advantage more permanent, to such an extent that when the middle ear cavity was free of disease or discharge resulting therefrom, the disc of court plascter would remain in position, until when shed by the natural exfoliation of the external epithelium, which usually takes about six weeks, it was then found that the perforation in the majority of instances was absolutely closed. No doubt this condition was brought about to some extent by the mildest form of local irritation, causing slight proliferation of the cells about the margin of the perforation, until final closure was produced. It may be, to some extent, that discs of court plaster cause some action like a skin graft. Heretofore, when discs had been applied it was done under great difficulties, either by the use of a cotton applicator or a thin wire applicator made with a loop turned at right angles. To avoid this difficulty the author devised an instrument, shown in Fig. 1.

For the purpose of making it more practicable to apply a disc under all ordinary conditions, this instrument is so constructed that the disc is protected during its travel through the auditory canal, or even a tortuously deflected canal, making it possible thereby to properly place the disc, providing the canal is not too small to allow the insertion of the instrument. There are some instances, however, in which the external canal may be small with a normal middle ear apparatus, and the canal may be so small as to scarcely allow the insertion of even an ordinary wire applicator. Under such conditions it would be next to impossible to apply a disc without a pro-

* Exhibited before the South Branch of the Philadelphia County Medical Society, April 26, 1907.

cedure of drilling out the external auditory canal. It is a well known fact that when spontaneous perforation of the tympanum occurs, even after all supperative conditions are controlled, the perforation seldom or never heals. If the perforations so made are recent, it is in this form of case, when the middle ear cavity is properly treated, that there is benefit in using a disc to improve the hearing, with the further advantage of the final closing of the perforation by the use of the court plaster disc, which has better, more than all other materials, quality of staying the full length of time to finally produce the result, about six weeks. It is surprising that in

Fig. 1.

some instances of perforation, when a disc is applied, how much hearing is improved, not considering the extra advantage of final natural closure of the perforation by cicatricial contraction.

A convenient syringe (Fig. 2) is herein illustrated, was originally devised in part as a lachrymal syringe. It also includes a middle ear pipe attachment, and is a most convenient syringe as the pipe is placed at about 45 degrees to the axis of the bulb. This allows a clear view upon the part of the operator and the bulb of the syringe has an advantage over the common rod and piston in not needing washers to be looked after, which, if a syringe is laid aside for any length of time are likely to become dry and out of commission.

After acute symptoms of middle ear disease have subsided, and in which the drum may have been lanced, then in a reasonable length of time the middle ear syringe should be used, washing through the perforation so made, using various antiseptic solutions, such as are familiar to a surgeon as lysol, carbolic acid, peroxide of hydrogen, etc., in their proper proportions of mixture. It is then, after all secretions have ceased from the middle ear cavity, that it is desirable to use the disc.

Of the instrument (Illustration, Fig. 1) the large part of the tubing holds the disc. Through the other part of the tubing passes a wire, which is attached at the end to a projecting plug, and this part of the instrument is made of silver to avoid rusting, and is gold plated. The forceps part is readily detached. After secretion has ceased from the middle ear cavity as the result of disease, the perforation is ready to have a disc applied and application is

Fig. 2.

made in the following manner: The end of the instrument which holds the disc is dipped in water and then snapped free of excess. With delicate forceps a disc is grasped by the least edge, and this is dipped in water and snapped free of excess. It is now placed in the cell, the sticking surface out. The disc is tucked in the cell so that there is no projecting edge. It becomes soft in a moment and is ready to be applied to the perforation. If the holder is not moistened, the disc will not hold to the ejecting plug when it is pushed from the cell, and the disc is likely to drop out of place when about to be applied to the tympanum. With this instrument the operator can have a perfect vision to locate the cite of the perforation. After the instrument is withdrawn, the disc may hang from its upper edge, not meeting the contour of the irregular surface and angles of the drum, and with a plug of dry cotton on an applicator the disc is pressed to its correct moulding against the tympanum.

At this stage nothing is to be done, but to allow the disc to stay, until by natural exfoliation the disc is cast off.

The ball of the syringe holds about half an ounce of fluid, which is plenty for washing great quantities of matter from the middle ear cavity. It is provided with a cone joint to the canula, so that the syringe is easily separated for purposes of refilling.

It may be stated that in most cases there is no trouble from the size of the external auditory canal in introducing the instrument which holds the court plaster disc. In the majority of instances of perforation following diseased middle ear, there is some good part of the drum left that will allow of attachment for the disc.

1208 Spruce St.

The Curative Influence of Secondary External Otitis. SIGISMUND SZENES. *Arch. f. Ohrenh.*, Leipzig, Dec., 1904.

The author has observed a number of cases of acute middle ear suppuration, complicated by an attack of diffuse external otitis. The latter would subside after a few days, and after it had healed all signs of the middle ear disease would have disappeared.

The author is of the opinion that the inflammation of the canal exerts a curative influence on the process in the middle ear, and quotes other observers who have noted the same phenomenon.

YANKAUER.

SOCIETY PROCEEDINGS.

NEW YORK ACADEMY OF MEDICINE.

SECTION ON LARYNGOLOGY AND RHINOLOGY.

Regular Meeting, April 24, 1907.

THOMAS J. HARRIS, M. D., Chairman.

PRESENTATION OF PATIENTS.

Epithelioma of the Epiglottis. By S. W. THURBER, M.D.

The patient, a Russian, 46 years of age, came to Vanderbilt Clinic on the 17th of April, complaining that for about four months he had been suffering from a feeling of fullness in the throat, some pain in swallowing, so that he is not able to enjoy his meals; and that he has been growing weak.

On looking into the larynx, a growth of the epiglottis was observed. Dr. Thurber presented a model which reproduced the condition very closely, except that the surface was slightly more granular. The growth was engaged in a laryngeal snare and a good portion of it was removed and sent to the pathological laboratory, which returned a report of epithelioma of the epiglottis. The growth was so completely circumscribed, and there seemed so little involvement of the neighboring tissues that a thyrotomy appeared to be the operation indicated. None of the glands of the chin or neck were involved. There was profuse bleeding when the growth was removed, and it was two hours before the bleeding was finally checked.

Perforation of the Septum Closed by a Plastic Operation. By SIDNEY YANKAUER, M.D.

This patient was brought down to enable the Section to see the result of an operation performed according to the method recently described by Dr. Yankauer in an article published in THE LARYNGOSCOPE. The patient, when first seen, had a perforation 8 mm. in diameter, situated in the cartilaginous portion of the septum, which had existed for many years. All the usual symptoms of perforation were present, the whistling, the chronic crust formation, and the odor, which interfered considerably with the patient's happiness.

This was the third case which Dr. Yankauer had operated upon by the method described in his paper, and the results were remarkably satisfactory. The operation will be described in detail in a future publication.

Foreign Body Removed from Bronchus. By EMIL MAYER, M.D.

The patient himself would show nothing interesting, but the speaker presented a foreign body which was removed from the left bronchus. The patient, a driver, 28 years of age, while taking some soup on the afternoon of October 30, 1906, inhaled a piece of bone, and it entered into his left bronchus, as was afterward found. He came to Dr. Mayer a month later, with the history that he had been coughing since inhaling this bone, and though he had seen several physicians none of them had afforded him any relief. The physical signs showed some irritation in his left lung. Fluoroscopic examination was negative and Dr. Mayer examined him with the bronchoscope under local anaesthesia, but failed to discover anything that would indicate the presence of a foreign body. Several subsequent attempts were made with the bronchoscope to locate the foreign body, but always without discovering any. These examinations, always under local anaesthesia, did not interfere in any way with the man's vocation. Within twenty minutes to half an hour afterward he was back on his wagon attending to his business. On the last examination (the sixth), a piece of bone was felt, but it could not be removed, then, as the patient was quite exhausted. The next day the patient had a violent attack of coughing, and the bone, which had evidently been loosened by the various manipulations, was brought up, so as a matter of fact the patient brought up the foreign body with the assistance of the bronchoscope.

DISCUSSION.

DR. MOSELEY inquired what position the patient had occupied while the bronchoscope was used.

DR. MAYER replied that at first the patient was in the sitting position, but later it was more convenient for him as well as for the patient that the latter should lie on his back, in the usual position under anesthesia.

Exfoliated Wall of Frontal Sinus. Shown by F. J. QUINLAN, M.D.

DR. QUINLAN told of a woman patient who had come to his service about a month ago, having been operated upon about ten

days previously for an abscess of the eyebrow. A movable substance was felt beneath the skin, an incision was made removing at same time a complete and symmetrical front wall of the sinus. The patient gave no history of anything that could account for such a condition—no history of trauma, syphilis, or anything which could account for this exfoliation of bone. Dr. Quinlan himself had operated subsequently on this patient for an empyema of the mastoid cells which had developed. Strange to say, about two weeks later the woman developed a general peritonitis, to which she succumbed in seven or eight days. Dr. Quinlan showed the exfoliated bone, which looked as though it had been chiselled out for anatomical purposes, and said that it seemed remarkable that such a sequestrum should have occurred idiopathically, as there was absolutely no history to account for the condition.

Intubation Tube which had been Worn by an Adult Patient continuously for Two Years. Shown by W. K. SIMPSON, M.D.

In reply to an inquiry as to whether the tube had been replaced by another, Dr. Simpson replied no, that it had only been removed the day before, and the patient was doing very well in the matter of breathing.

Some Observations upon the Causes of Voice Failure in Public Singers. By Mr. W. J. HENDERSON of the *New York Sun*. *(Published in full in* THE LARYNGOSCOPE, *June 1907, page 429.)*

Some Observations Upon the Cause of Voice Failure. By D. BRYSON DELAVAN, M.D.

DISCUSSION.

DR. CLARENCE C. RICE, who was unable to be present, sent a few remarks on the subject of the evening, which was read by the Secretary. (Letter herewith.)

The subject is a large one, for the "Causes of Voice Failure in Public Singers," are numerous. To commence somewhat at the beginning, certain public singers are more prone to vocal disability than others, because they have weakened their vocal muscles in the very commencement of their career, in the earliest years of study, before they have made a public reputation. It cannot be too forcibly impressed upon the mind of vocal teachers, the importance of *very slowly developing* the strength of the laryngeal muscles. Most students of the voice are naturally anxious to note rapid progress and if they cannot get this result from one teacher, they are apt to

go to an instructor less conservative. Common sense would demand the slow rather than the rapid development of any set of muscles, that they may not become over fatigued and tired; but there is a reason for special prudence in the strengthening of the vocal muscles.

In the amateur larynx, there is an abundance of soft sub-mucous tissue on the sides, above the vocal cords, and also in the posterior commissure. In the mature larynx, this soft padding has been absorbed by muscular activity. In the amateur larynx, the vocal bands show but little width, because of this protruding, soft tissue, the sides of the larynx being almost convex. In the professional throat, the sides of the larynx are concave, and a much larger width of vocal band may be seen in the mirror. This absorption of the soft tissue can only be brought about, properly, by the constant and very moderate employment of the muscles which approximate the vocal bands.

Undue haste at this stage of vocal development produces impairment of the muscular power, which may handicap the professional singer all his life. These people, under the stress of heavy singing, go to pieces more quickly than those who have laid the foundation in a more conservative way.

The above condition is frequently the cause of the vocal fatigue which young singers so frequently experience. Not many vocal instructors understand this anatomical condition.

Another frequent cause of voice failure in singers who are called upon to perform strenuous roles, is that they are endeavoring to execute pitches which are either above or below those best adapted to the general construction of their larynges, and the length of the vocal bands. A trained laryngologist can, I believe, state quite positively, from the length of the cord observed, the range most applicable to the individual. This season I have seen a baritone go to pieces easily, because he ought to have been cast for tenor roles. We more frequently, however, see voices adapted for medium pitches disastrously endeavoring to execute the highest soprano parts. The vocal teacher should ask the assistance of the throat specialist in determining the character of the singing to be followed by the pupil.

In the special interest with which the laryngologist considers the singer of great reputation, he may forget that the most noted performer suffers from the same usual catarrhal conditions which effect the most ordinary mortal. Every year I see, with amazement, common catarrhal conditions which have been left untreated

in people who have wonderful voices. We are not surprised to find more or less nasal obstruction from deviated septa, but we have recently seen enormous tonsils, very much elongated uvulae, and lateral posterior pharyngeal thickenings which would not have been tolerated in a school child. I need not say that such obstructions to nasal respiration very much increase the effort necessary to produce a large clear tone, and the laryngeal muscles very soon become fatigued. If singing is persisted in after the vocal adductors become tired, congestion of the vocal cords, more or less chronic, and vocal nodules may easily follow, because of the strain and the uneven action of the laryngeal muscles. It requires fine discretion to determine what, if any, in the way of operative work can be safely performed upon singers, while they are executing their season's engagements. A very bad larynx can be made better by some forms of operative work, but a larynx nearly normal can quite as easily be made worse. Even simple nasal operations are followed for a time by a dryness of pharynx and larynx, which embarrass the singer, and tend to produce chronic disturbances in the way of laryngeal congestion and dryness, and muscular fatigue.

A more remote cause of vocal failure sometimes exists because of the foolish and unsanitary manner in which many singers, especially those from the other side of the water, live in New York, during the winter season. Not much can be said in favor of the climate of this winter which has just passed, but we know of singers who never get a breath of fresh air, or indulge in any form of physical exercise. Indigestion, constipation, a coated tongue, a torpid liver, are the results of this method of living, and these easily cause a sluggish congestion and relaxation of the pharynx and larynx. All conditions must be favorable for the very best voice in great singers. I have seen a voice gradually fail, and a vocal cord thicken along its edge, where there was no observable reason for it, except great mental distress. I suppose we ought to say that mental anxiety interferes with that proper vocal production which is absolutely necessary in obtaining great results.

I have no right to take more of your time, and I am sure the matters of proper vocal production, voice placement, intelligent breathing, will all be thoroughly covered by the papers of the evening. I have endeavored to suggest two or three causes of vocal failure which are not so frequently dwelt upon, when this interesting subject is being discussed.

DR. F. E. MILLER: It is doubtful if this Section has ever heard two papers that promise to be of such permanent interest as those read here this evening in the subject of *voice failure in public singers*, by Dr. Delavan and our distinguished guest, Mr. Henderson.

In general, laryngo-pharyngeal observations are so replete with inaccuracies, so far, at least, as voice and voice production are concerned, that it is extremely difficult, if not quite impossible, to arrive at conclusions of value. In order, therefore, to furnish a basis of solid facts, upon which all can equally depend, the study of individual cases should be, for the time being, abandoned, and the thousands of observations made by the different schools and investigators should be ascertained, and exhaustively examined. The physician, the physicist, the singing teacher and the performers should concentrate their combined energies, and work harmoniously, for the purpose of ascertaining a method of voice production, which, if followed, will make a voice failure a thing of the past.

Before proceeding further, it may be well to give a definition of the term "voice failure," something that has not been attempted by either of the essayists. Voice failure may be said to be a more or less rapid decadence of the normal singing or speaking tone, beginning with a marked decrease of power, a deflection from the pitch and loss of quality, which sometimes results, if permitted to continue, in total inability to create sound. This deplorable condition quite often results from pathological conditions as well as from the causes described so ably by Mr. Henderson, i.e., persistent forcing of the tone, singing out of registers, or through colds, and bad vocal attack. *Vocal nodules*, produced chiefly by *follicular tonsillitis, paralysis of the vocal chords*, arising from divers causes, such as shock, intestinal troubles and disturbances of the digestive organs, chronic laryngitis, trachoma of the vocal chords, corditis tuberosa, over stimulation from spraying, disturbances on the surfaces of the hollow spaces, syphilitic infiltrations of the respiratory tract and hypertrophy of the tonsils are all direct causes of failure of the voice.

It is, of course, perfectly true that certain of these conditions will yield only to medical or surgical treatment; but it has also been definitely established that a great number can be not only cured, but absolutely prevented by recourse to a synthetic method of voice treatment, by which is meant a treatment based on the laws of scientific muscular control.

This statement, no doubt, contains elements of surprise, nevertheless, on investigation it will be found to be not exaggerated. For

in every case of voice failure that has come under investigation, it has invariably been observed that the muscular action has in some way become deranged. Other symptoms vary, according to the individual case, but this condition never varies; it is always present; it is a *sine qua non.* This derangement causes over-contraction of certain interfering muscles, such as the chin, the tongue and the jaw, thereby weakening the action of the voice-producing, or extrinsic muscles, namely, the *stylo-pharyngeus, sterno-thyroid, levator-palati, tensores-palati, palato-pharyngeus, superior constrictor,* and the *sterno-hyoid.*

Now, inasmuch as one set of muscles may be said to depend on the other, it necessarily follows that, in order to insure the correct action of the instrinsic muscles, the extrinsic muscles must be in a normal condition. The intrinsic muscles alone, except for the mere act of approximation, are practically incapable of voluntary control, but once secure the proper adjustment of the intrinsic and the extrinsic muscles, and the production of the long sought for *standard-tone* is assured.

Doubtless, the sceptics will assert that this is impossible of accomplishment, for it is well known that these persons have concluded long since that the true method of tone production is not destined to be discovered until Gabriel sounds his clarion trumpet to announce the arrival of the millenium. However that may be, I have no hesitation in stating here tonight that exercises have already been devised by which control of the extrinsic muscles can be gained, and the over-contraction in the interfering muscles can be removed. These exercises are not founded on the fantastic theories of unreliable faddists, but are the result of an exhaustive study of the scientific principles governing voice production.

Since the foundation of all good tone production is correct breathing, it may not be thought out of place to set forth precisely what that means. It may then be stated that when a proper method of breathing is employed, the inspiratory effort consists of the contraction of the diaphragm, and the expansion of the ribs. The expiratory effort consist of the relaxation of the diaphragm and a contraction of those muscles of the abdomen and lower back, which pull the ribs inward and downward. By contracting and pushing forward the muscles known as the *rectus-abdominis,* thus causing a violent expulsion of breath, it will be found that the index point of attack is directly below the base of the sternum. For the purpose of sustaining the tone, the ribs must be controlled, in order that they may not fall

too rapidly, and the other muscles must be kept flexible. When this method is properly used, the results may be truthfully described as correct.

To discuss this interesting topic at greater length would be to encroach unduly on the time of others; if, however, I have succeeded in showing that the last word has not yet been said on the question of voice failure, its cause and its cure, I shall have achieved the task to which I set myself when I came among you this evening.

DR. HOLBROOK CURTIS said that in the two papers read so little had been said of the causes of the failure of the singing and speaking voice, in proportion to the great number of causes which exist, that there was very little to take up in the discussion; and for any one who had noted innumerable causes of voice failure, five minutes would seem an inadequate time in which to discuss them.

There were two or three points in Mr. Henderson's paper to which he would refer briefly. In the first place, he spoke of the misdirected efforts of the singers in the Grand Opera House to please the public who buy the seats and applaud vociferously at every expression of the high notes. A great many people have their voices trained for loudness instead of for overtones or harmonics. There are two ways of pleasing in a house like the Opera House—by the quality of tone, or, by the amplitude, and each appeals to a different class. The tone emitted by Sembrich, who has a charming manner of emitting her notes, is full of overtones and fills the largest auditorium. If you get that peculiar resonance in the voice it will carry everywhere, for overtones in the voice are like the electromotive force in electricity. It is the same relationship as exists between volt and ampere. If you have the proper voltage the ampere will do the work.

This kind of singing appeals to the intelligent music lover, but there is unfortunately a class which simply waits for an unnatural explosive climax.

To accomplish loudness the singer is apt to carry the lower mechanism into production of the upper tones, raising the pitch by increasing the air blast instead of by a readjustment of the vibrating segments of the cords. In other words forcing the registers is one of the commonest forms of voice destruction.

Baritones generally have a favorite note which they bellow wide open and that is *re* or *mi*. We know that it has been the cause of their breakdown because we have so often repaired the machinery by making them close the note. So also the open *fa* and *sol* are the

stumbling blocks of the tenor voice. The absence of overtones causes voice failure in that the cords are not called upon to respond in their vibration to the pitch of the tube as does the reed in the vox humana pipe I show you. The cavities above must be brought into action as resonators in order to take the wear off the cords which have been calloused by giving the initial impulse in the method known as the *coup de glotte* or stroke of the glottis.

Well has Mr. Henderson said that the absence of effort causes the fulfillment of tone harmony, for only by absence of all muscular tension can the tones be replete with overtones, and shown to be mathematically correct by Koenig's manometric flames; for after all, true harmony is the completion of the mathematical tone equation.

The so-called methods of singing teachers are a curse upon voice training, for only by the entire absence of anything artificial can we produce the perfection of tone. The function of the teacher should be to correct the unnatural, and exercise the muscles in the equilibrium which has been provided by nature, rather than to accentuate the activities of certain groups.

Dr. R. C. Myles said that from his observation in Europe and this country he felt that the true method of teaching was one of imitation. The pupil should imitate some one who is able to produce the note desired. He suggested that teachers of singing should form an association, where this question could be discussed and some conclusion reached. Everything seems in confusion at present. According to his observation, many singers lose their voices too early in life. Is it the fault of the doctor, the teacher or the singer? We observe many voices which have been lost by pathological conditions. These have been allowed to continue because the patient was a singer, and some one was afraid to do the right thing. One of the singers who had been mentioned tonight "broke down," and her ethmoidal turbinals had undergone polypoid degeneration. He had removed the turbinal tissues, and today she is singing as well as ever. Such conditions were of frequent occurrence. He had often found pathological conditions which had existed for years, and the poor singer had been trying to sing in spite of them. He had seen tracheitis slowly extending with its consequent thickening of the sub glottic region, thickening of the mucosa over the crico-arytenothyroid muscles, which prevented the proper vibrations of the so-called cord. On the other hand, there are many cases of arthritis of the arytenoidal, and crico-thryoidal joints. He had had occasion to treat several cases of infected tonsils causing serious impairment

to the voice. The cervical glands in these cases, are enlarged and affect the pneumogastric nerve and the veins; there was more or less pressure upon the nerve filaments of the lingual muscles, interfering seriously with the voice production.

The subject is a broad one, and he would advocate that the human chest and all of its adnexa—muscles, diaphragm, etc., be trained independently of the teacher or method, and then have the singing teacher apply to the voice the methods which the consensus of opinion would advocate for the production of the best voice.

If the great singers would teach more while they are at their best —not wait until they begin to break down—we would have more worthy successors to their methods.

We are making sound and safe progress in proceedures and technique for the removal of pathological conditions, without injuring the voice production.

PROF. SCRIPTURE, formerly of Yale University, now of Columbia, said that he had come to listen and to learn, and felt that he had passed a most valuable evening. Dr. Delavan had suggested that it would be a great convenience if the singer's voice could be tested from time to time, so that improvement or failure could be noted and a record obtained of the various methods of instruction in singing. Some methods have been devised for doing this which are very laborious and expensive, but they are in no sense practical—the gain from months of work being only a single fact. There is one method, however, which is very convenient and the apparatus for which can be set up by any one in his office at small expense, and by means of which he can test his patients with certain conditions of voice.

Professor Scripture then sketched on the board a figure, showing what he had been doing for the Carnegie Institution in the study of the attack of tones by singers. Suppose you put in front of the singer's mouth a small receiving trumpet, and from that trumpet bring a rubber tube to a very small manometric capsule, covered with the thinnest kind of rubber membrane. On top of that place a very fine straw lever, the tip of which writes on a smoked drum. When you speak or sing into this instrument, the lever records the pressure of the air and the vibrations from the larynx.

Records of the three kinds of attack of a tone by a singer were then reproduced. The breathy attack showed an emission of the breath before the vibrations begin. The record of the *coup de glotte* showed an explosion of air with strong vibrations. The clear begin-

ning showed no sudden deviation in the pressure line; the vibrations almost instantaneously reached their full intensity in a well-trained voice.

With the same apparatus it is possible to study the vibrato, the tremolo, the trill, the rate of expenditure of the breath, the breathiness of a tone, etc. The variations and inaccuracies which are too fine to be heard by the ear can be seen in the records.

The method can be used to make a scientific analysis of a singer's voice, to measure the changes that occur in it during training, to detect the symptoms of voice failure, and, in many cases, by an appeal to the eye to correct the faults of the singer.

Dr. Emil Mayer said that he had little to add to the subject which had been so thoroughly and ably presented. Dr. Myles had brought up one point, which has been discussed over and over again—how far may we go in certain operative attacks on growing children or young adults who have aberrations in the vocal regions. Every laryngologist has sometime encountered the objection that if the tonsils were removed the patient would have a falsetto voice forever. Of course that has been denied time and time again, and yet there seems to be a popular prejudice on this point, though absolutely without rhyme or reason. The practical value of such a presentation as had been made this evening is an impetus to the further and more careful study of these conditions, and it was a privilege to hear the expressed opinions of one who had perhaps listened to more human voices than any one else present, who had seen and heard the great singers in their height and in their failure, who was perhaps, able to note at once the cause of the failure, and who surprised us when he discovered breaks in singing when we had thought the rendering perfect.

Dr. W. K. Simpson said that he thought that this was a matter which ought to elicit from the Section all the discussion possible. After a great deal of attention given to the subject, he himself felt more convinced every day that as a matter of bad method of singing versus over-use of voice, the question of deterioration can be summed up in over-use. Professional singing is an unnatural use of the human voice. Voice was given to man for the purpose of maintaining conversation, as the legs were given for the purpose of walking—when we run, they give out; the eyes were given for ordinary observation, when used with the microscope or overstrained, they give out,—and so on through the whole category of human functions. Certain individuals are better endowed with sing-

ing voices than others; some can run longer than others, some can see better, some can hear better and longer than others, but age and over-use soon show their effects. Certain nationalities seem better endowed with singing voices than others. What nations compare with the Italian in this respect? They are natural singers. There is no American type of singing. Those who have examined Italian singers find less laryngeal trouble. They are better endowed in this respect than other nations.

Then there is the question of large houses. There are every-day singers, every-day soloists, who cannot satisfactorily fill any large auditorium. If you are down in the orchestra seats or near the stage you will hear very well, but if you are up in the first and second galleries you don't. There are only a very few voices which can satisfactorily be heard in all parts of large auditoriums. Take these same voices, put them in some smaller room, and you get pleasure from hearing, but not in the large halls, or opera houses, and it is this effort to fill large areas that is such a potent factor in causing failure. He had once asked a celebrated musician why it was that taking all the philharmonic and symphony societies of the world where you find expert musicians—why it was that among all these thousands of expert musicians you find only one Ysaye, or one Paderewski? He replied that it was a "God given gift." That settles the whole question of the ability of the individual to hold his voice in singing. I have not gone into the subject of physical causes of voice failure other than over-use; but it goes without saying, that in order to maintain the singing voice in its purity—before advancing age sets in—there must be perfect health, proper care of health, avoidance of alcohol and tobacco, abstemious living, mental poise and perfect mucous membrane conditions of larynx, pharynx, naso-pharynx and nose, and an absence of deformities of these parts.

Dr. F. J. Quinlan said that he did only the ordinary work of a laryngologist and did not know much about singing, but it seemed to him that there was a simple way out of this question if one considers the physiological and anatomical structures of the throat. Look at the bird; he does not worry about his nose, his bill, or his gullet, but simply opens his mouth and lets the notes fall naturally. We must consider three conditions. We have two big cylinders filled with air, and from these an outlet. We all know that, according to the laws of physiology, as the air comes through the gullet it produces a squeak like that of a pig, and unless this is reinforced by

the action of the pharyngeal muscles and receives its impulse upward, backward, or forward,—if it fails to get this, or does not get the proper impulse from the resonating cavities of the head, the voice is a failure, just as much in speech as in singing. Dr. Simpson had just said that we cannot always run. No, and we cannot always sing. We have three sets of muscles employed in the larynx, the opening and closing, and the auxiliary or those employed for singing purposes. He had seen a few throats, but most of these patients apply for treatment when their throats are defective, and not obeying the laws of health.

He had come tonight hoping to learn much, but went home disappointed, feeling that he had added little if anything to his store of definite knowledge on the subject under discussion.

Dr. J. A. Kenefick said that he had greatly appreciated the papers heard tonight on this important subject which concerns a large number of people in every community, and which should be studied with the utmost seriousness in order to reach some proper method of solution. A point which impressed him more forcibly than ever, was one which he had dwelt upon in a paper read before the Section in 1903. If the individual feels inherently the desire to sing, and is blessed with the three G's to which Dr. Simpson had referred, one of the first things which that individual would do, would be to consult a teacher who would tell him that his voice must be trained. The next step should be that the teacher would first determine whether that individual had a perfect singing apparatus. If that were determined in the beginning, many of the so-called failures which occur in succeeding years would be avoided. Every one present had seen persons who have studied in this country and abroad who have always been victims of some difficulty which no teacher has been able to overcome. An examination would reveal some pathological obstruction whose presence was fatal to any proper emission of tone. He therefore repeated that if there was one point which impressed itself upon him more strongly than any other, it was that those who desire to take up the cultivation of the voice should first call upon some reliable laryngologist and learn whether the vocal apparatus was ready and fit to be put through the great strain required by voice cultivation; that point being determined satisfactorily they could then go ahead.

Dr. Delavan, closing, said that the subject was too broad to be thoroughly taken up in one evening. His own views on the subject could be summed up by saying that the need of the present

time, considering the great amount of study which had been given to vocal training, and the large number of able men who had devoted themselves to it, is the influence of a genius who should devote himself to the study of what had already been done to eliminate the useless matter, to recognize that which was good, and to place the art, as far as possible, upon a scientific basis. It might be impossible to make a science out of an art, and it was improbable that musicians would ever be created upon purely scientific lines; the art, however, could be placed upon a more scientific basis than was the case at present. Until something of this kind was done, we would probably talk, discuss, read papers, and combat each other in the future as had been done for many generations in the past.

A Laryngeal Medicator for the Patient's Use. Presented by SIDNEY YANKAUER, M.D. *(To be published in full in a subsequent issue of* THE LARYNGOSCOPE.*)*

Should Cases of Acute Diffuse Purulent Otogenic Leptomeningitis be Operated upon? R. SOKOLOWSKY, *Arch. f. Ohrenh.*, Leipzig, Dec. 1904.

In the case here reported, the presence of meningitis was established by the concurrence of many classical symptoms: fever, rapid pulse, optic neuritis, rigidity of the neck, Kernig's sign, vomiting, stupor, and the presence of pus cells and bacteria in the fluid obtained by lumbar puncture. After the removal, by one operation, of large quantities of pus and cholesteatomatous masses, which had invaded the labyrinth and the facial canal, and had perforated the roof of the tympanum to the dura, and a second operation to drain an abscess surrounding the sinus, the patient made a slow but complete recovery.

The procedures resorted to in this case were justified, not only by the result, but also by five similar cases which the author quotes from literature, and he concludes that, in these cases, the operative interference, though frequently hopeless, may afford the patient an additional chance for recovery. YANKAUER.

EDITORIAL DEPARTMENT.

Managing Editor and Publisher:
M. A. GOLDSTEIN, M.D., St. Louis.

EDITORIAL STAFF:

S. Scott Bishop, M.D., Chicago; W. M. C. Bryan, M.S., M.D., St. Louis;
F. B. Eaton, M.D., Portland, Oregon;
Dr. C. von Eicken, Freiburg, i. Br., Germany;
Prof. G. Ferreri, Rome, Italy; Dr. Gottlieb Kiaer, Copenhagen, Denmark;
Dr. A. Kuttner, Berlin, Germany; M. D. Lederman, M.D., New York;
Dr. Emilio Martinez, Havana, Cuba;
Dr. J. F. van Mens, Amsterdam, Holland;
Harris Peyton Mosher, M.D., Boston;
H. Russell Nolan, M.B. (Syd.), Sydney, Australia;
Dr. W. Okada, Tokio, Japan; Francis R. Packard, M.D., Philadelphia;
Edwin Pynchon, M.D., Chicago; W. Scheppegrell, M.D., New Orleans;
O. J. Stein, M.D., Chicago;
StClair Thomson, M.D., F.R.C.P., Lond., F.R.C.S., Eng., London;
Dr. Herbert Tilley, London, England;
A. Logan Turner, M.D., Edinburgh, Scotland;
W. H. Vittum, M.D., St. Paul, Minn.; W. A. Wells, M.D., Washington, D.C.;
D. J. Gibb Wishart, M.D., Toronto, Canada;
Sidney Yankauer, M D., New York.

NOTICE TO CONTRIBUTORS.

Manuscripts for the Original Department are received with the understanding that they are contributed exclusively to The Laryngoscope. MSS. should be typewritten on one side of paper only.

Articles will be illustrated without expense to the authors when suitable drawings or photographs are furnished. As few authors have sufficient ability as artists, it is advisable to have original drawings made by a medical artist under the author's supervision. Authors will receive proofs for correction, which they are requested to revise and return promptly.

100 Reprints will be furnished authors gratuitously. If additional reprints are desired, an order blank, with scale of prices, accompanying proofs of article, should be filled out and returned with proofs.

News Items. Our readers are invited to contribute any items that they may find of interest for our News Department.

The Date of Issue of The Laryngoscope will be the 20th of each month.

Subscription Price $3.00 per annum, in advance. Foreign subscription, 15 shillings.

Subscribers will prevent inconvenience and delay in receiving the journal by prompt notification of change of address.

All Communications and all drafts and money orders should be addressed to

THE LARYNGOSCOPE CO.,
3858 Westminster Place, St. Louis, Mo.

LABYRINTHINE SURGERY.

About fifty years ago the distinguished English otologist, Wilde, dogmatically asserted that it was not incumbent upon aurists to become intimately acquainted with the anatomy of the internal ear, because in this region surgical intervention was out of the question.

If Wilde were living today, he could learn that last year Hinsberg, in a report to the Fifteenth Congress of German Society of Otologists, collected for purposes of study 102 cases of operation on the labyrinth—not counting the reports of cases of simple removal of sequestra. Of these, 9 were practically healthy labyrinths, the operation being done for the relief of vertigo; the remaining 93 being done on account of an existing suppuration or necrosis.

That interest is now being centered upon the labyrinth in all parts of the world is evidenced by the fact that it was made the subject of a symposium at the International Congress of Bordeaux in 1904, of the last Italian Congress of Otology, and at our own Society of Rhinology, Laryngology and Otology just ended. Of those who have contributed something of value to the subject, we should mention especially the work of Jansen, Hinsberg, Boesch and Friederich in Germany, Milligan, Tilley, Grant and Lake in England, Gradenigo, Rugani and Poli of Italy, and Lermoyez and Bellin in France, and in our own country the recent brilliant work of Richards of New York.

No one is fully abreast with the subject; furthermore, there has not been read the masterly discourse by Brieger of Breslau, on the pathological anatomy of the labyrinth, and the contribution of Professor Stefani of Padua, and the scientific paper of von Stein of Moscow, bearing particularly on the subject of vertigo and equilibration.

If in the past we have been taught to believe that the labyrinth is, surgically speaking, a negligible organ, because practically immune to the encroachment of disease processes going on in its immediate proximity, we may be obliged, in the light of recent investigation, to revise our views and to regard the labyrinthine as a vulnerable area.

If we may believe Jansen, the cases of pyolabyrinthitis complicating suppurative otitis media outnumbers all the intra-cranial complications taken together.

Friederich found that in about 7,500 cases of suppurative ear at the clinics of Halle and Kiel, there was a record of 68 cases of suppuration of the labyrinth, showing that this complication may be expected in nearly one out of every hundred cases.

These cases were nearly all diagnosed either upon the operating-table or post-mortem. Seldom is a pyolabyrinthitis diagnosed beforehand, owing to the fact that the clinical demonstration of this disease is difficult and based upon signs and symptoms which at the present time are not usually sought for or properly interpreted.

In the future it is imperative that more study should be devoted to the non-acoustic labyrinth, for it is in this part that arise the distinctive symptoms due to disturbance of the equilibrating functions, and experience shows that involvement of the vestibule and semi-circular canals precedes involvement of the cochlea.

We have before us recent numbers of Italian journals of Otology and Rhinology (*Archivio Italiano di Otologia*, Torino, 1907, xviii; *Bolletino delle Mal. delle Orecchio della Gola e del Naso*), containing the proceedings of the last Italian Congress of Otology. We note with interest that much attention is given to the physiology of the non-acoustic labyrinth, and to clinical methods of diagnosing labyrinthine disease, by such authors as Cradenigo, Nuvoli, Rugani and Ostino.

According to Rugani, a study of the muscular sense in labyrinthine disease should be made from both a static and dynamic standpoint, and he describes in detail dynamometry, ergographia and cinesigraphia in their applications to such cases.

Ostino has an article in the clinical examination of oculo-motor troubles in ear diseases, in which he dwells at length on the characters of oculo-motor troubles originating in lesions of the non-acoustic labyrinth, and Ostino and Rugani have joint contributions in which they map out in detail a scheme for clinical examination of the non-acoustic labyrinth for symptoms of both the asthenic and astasic type.

Gradenigo, discussing these papers, denies the existence of a true labyrinthine tonus, in the sense that it is understood by Ewald. The apparent loss of muscular force, he explains on the theory that

the patient whose static organ is disturbed is obliged to expend energy that the normal individual does not, in merely maintaining his equilibrium, and that this muscular fatigue is produced.

The questions are intimately allied with diagnosis of labyrinthine troubles, and it will require painstaking observations with such instruments of precision as the recently devised dynamometrograph of von Stein, or the ergograph of Maltese, to determine eventually their exact practical value.

We cannot insist too strongly on the use of all measures that may aid in the diagnosis of this insidious complication, which, according to recent statistics, is present in at least half the deaths that take place from intra-cranial affection following ear disease, and is probably in many more cases than was formerly thought the road of infection to the brain.

The clinical picture upon which we are accustomed to base a diagnosis of cerebellar abscess will answer almost perfectly for labyrinthine disease. Vertigo, nausea, vomiting, cephalalgia, nystagmus and disequilibration are symptoms common to both affections.

How valuable, therefore, to have any clinical data which will aid in deciding in certain cases whether our surgical activities should be directed toward the labyrinth, or whether we should at once open posteriorly and explore the cerebellum!

Of the indication for operating, of the relative value of slight and extensive attacks upon a suppurating labyrinth, of the technique to be followed, much has yet to be learned.

The actual benefit of any intervention at all cannot be decided until we can compare the results of the operated cases with those where the diagnosis has been certainly established and the condition allowed to progress without interference. Outside of the question of mortality, earnest consideration must be given to the consequence of surgical destruction of the labyrinth in the patients that survive. Cheatle found that the vestibule and canal could be removed without loss of hearing in case of pyolabyrinthis, and Lake made the same observation in which the removal of these parts was undertaken for the relief of vertigo in a non-suppurating labyrinth.

Richards states that in one of his cases in which the cochlea, as well as the vestibule and arches of the semi-circular canals, were removed, the patient could hear afterward all of Hartmann's set of forks, and the thirty-five thousand Koenig's rod.

Doubt naturally arises as to the permanency of these results; and while awaiting further data to guide us in our procedure, we ought constantly to bear in mind the possibility of infecting a sound organ and destroying not only its own highly important function, but the danger also that the infection may be transmitted to the intracranial contents.

Too much stress, we feel, cannot be placed on this aspect of the subject, in view of the strong tendency among aural surgeons to sacrifice exact clinical methods of study to the exaltation of a showy technique, and to deceptive immediate results.

Let us accept these results only for what they are worth, and interpret them in terms of actual benefit to the patient, and let us not fail to faithfully exercise a solicitous surveillance over all diagnostic clinical information that may be utilized in formulating indications for operation.

If we approach the problem of labyrinthine surgery with these principles in mind and continue to be guided by the very ancient but still laudable motto, *primum non nocere,* we will find that inevitably we shall be led to attempt, with regard to disease processes in this little known locality, to accomplish the greatest possible good with the least possible intervention. W. A. WELLS.

The Abuse of Devices for "Curing Deafness." SIGISMUND SZENES *Arch. f. Ohrenh.*, Leipzig, Dec. 1904.

After thoroughly testing a certain device, which had been advertised in the daily papers as a "sure cure" for deafness, and demonstrating that it was utterly valueless and even harmful, the author, acting in the name of the otological section of the Königl. Gesellschaft der Aerzte in Budapest, appealed to the Hungarian Patent Office, and succeeded in preventing the granting of a patent for said device.

(The opening clause of the legal form of application for American Letters Patent would offer sufficient ground for similar action in this country.—Y.) YANKAUER.